

AVIATION WEEK

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PROCUREMENT FOR AIR POWER

SEPT. 25, 1950

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ask the men who KNOW L-M High Intensity Runway Lighting



WRIGHT: amazed at low operating cost.

Ask H. C. WRIGHT at Nashville

You'll get an enthusiastic answer from H. C. Wright, the capable superintendent of Berry Field. "We've had some remarkable experiences here since we installed high intensity lights, and their performance has been most gratifying to pilots and to the city. The controllable beam eliminates glare while taking full advantage of the high candlepower. The lights are most definitely paying for themselves in improved operation and increased safety for ships and passengers."

● Ask pilots and other airlines men, airport consultants, airport managers, and the many other men who know the problems of operation in marginal weather! They know the advantage of L-M high intensity runway lighting. They know the value of its extreme penetration without glare, its low operating cost, its high intensity controllable beam. For information on this and other L-M lighting for large and small airports, ask the L-M Field Engineer, or write Line Material Co., East Stroudsburg, Pa. (a McGraw Electric Company Division).



FOX: better operations in all kinds of weather

Ask FRANCIS FOX at Worcester

Worcester, Mass., was one of the first city-owned airports with L-M High Intensity Lighting on all runways. Manager Francis T. Fox and members of the City Airport Commission made a very careful check with other airport managers before the decision was made. Captain Fox, a pilot himself, recently told us: "We've had nearly three years of operation now with high intensity lights on all runways. Our lights have proved their value with better operations in all kinds of weather."



CROSS: pilots see lights 50 miles away.

Ask HANK CROSS at Birmingham

"When I was test flying B-29's here during the war and until 1949, the blackest area was over the municipal airport. The mountains and smog conditions peculiar to Jones Valley added to the problem," writes H. T. Cross, well-known Director of Aviation of Alabama's biggest municipal airport. "Last fall we installed high intensity lighting on all three runways. Airlines, pilots, and tower operators are all most enthusiastic. Pilots report seeing the lights more than fifty miles away. Typical pilot's comment: 'Now I won't be trying to let down on the First Avenue street lights instead of the runway!'"



L-M's 180,000 cp. high intensity runway light with the famous controllable beam.



LINE MATERIAL... Airport Lighting

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are **POWERED** by Westinghouse

Being penetrators, these planes must carry out tactical missions deep into enemy territory. To provide the required fuel economy and dependability, Westinghouse J-34 turbojets have been chosen for their power plants.

Westinghouse is constantly striving for improvement in jet propulsion... to provide only the best for the United States armed forces it is privileged to serve.

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AVIATION
GAS TURBINES



B.F. Goodrich



**New plane lands in 80 feet
on B. F. Goodrich brakes**

THIS AIRPLANE takes off and lands in less space than any other world record aircraft. It's the new Piper Super Cub '165'.

In one flight, the 165 has landed in the width of a one strip, linked to a stop in only 80 feet! One of several outstanding features that make this performance possible is the B. F. Goodrich brakes—standard equipment on all Piper models.

B. F. Goodrich Superduty Tube brakes absorb more kinetic energy for their weight than any other brake. Maximum

power results from the expander tube action, which applies equal pressure over the full circle of the drum. This also permits smoother operation, with no grabbing or locking, and slower, more even wear.

Stowaway is another built-in feature of B. F. Goodrich brakes. They are lower parts—and they last longer. Maintenance takes less time, although the job handled with a screwdriver and pliers. Even the spin brakes and tires disappear rapidly.

Because TFG brakes have so many

big advantages, they are in growing by leaps and bounds. They're on the biggest planes (like the B-56 and Constellation), the fastest (Stinsons, Beechcrafts), as well as private planes like the Super Cub and Navion. Goodrich research makes B. F. Goodrich aviation products best. The B. F. Goodrich Co., Akron, Ohio.

B.F. Goodrich
FIRST IN NUMBER

[illegible]

Flying up and down and across the Rockies, Frontier Airlines' planes need a refinery that demands unfailing engine dependability. And from long experience, Frontier knows it can count on that dependability — and economy, too — with Texaco Aircraft Engine Oil and Texaco Lubrication Engineering Service.



dependable side-by-side. Map shows nearly 1,000 units-sites, looking more than 50 years and some in seven states. For dependable engine lubrication in difficult flying territory, *Fragger Airlines* uses *Texaco* *Offroad* *Aviation* Oil exclusively.

Let Treco help make yours a more profitable operation. Just call the nearest of the more than 2,000 Treco Wholesale Distributing Plants in the 48 States, or write The Treco Company, Aviation Division, 135 East 41st Street, New York 17, New York.

A black and white portrait of a man in a military uniform. He is wearing a peaked cap with a crest and has several stars on his shoulder, indicating a high rank. He is looking slightly to the left of the camera with a serious expression.

The dissemination of pertinent information to additional potential sources is a valuable service to both the Air Force and the aviation industry.

A black and white portrait of a man in a naval officer's uniform. He is wearing a white cap with a dark band and a gold emblem. He has a mustache and is looking slightly to the right. The background is a plain, light color.

The Bureau of Aeronautics is undertaking, with all of the means at its command, to alleviate the trials of this period of transition from plans and expectations to requirements to deliver the hardware. Adjustments in programs, assistance in acquisition of facilities and materials, approval of extensive subcontracting, and entertainment of proposals of newcomers to the industry are offered, all with a view to getting the equipment on order on schedule and at a reasonable price, and toward improving our mobilization potential if this be required.

KKW

K B Waters
Lieutenant-General, USAF
Deputy Chief of Staff, Materiel

A. M. Cook.

A. M. Peters
Rear Admiral, USN
Chief, Bureau of Aeronautics

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NEWS DIGEST

Rentzel to CAB

Senate confirmation was expected late last week on the nomination of Delos W. Rentzel to become Chairman of the Civil Aeronautics Board, and of Donald W. Nyrop to succeed Rentzel as Civil Aeronautics Administrator. Nyrop has been deputy administrator.

Close coordination between CAB and CAA is expected to result from the Rentzel appointment, possibly leading to a merger of the two federal agencies, separated in 1946. In this event CAB Chairman Rentzel probably would also serve as administrator, following the pattern of the Maritime Board and Maritime Administration responsibilities (Aerospace Week, June 12).

Edward M. Strubbin, executive assistant to the administrator, probably will succeed Nyrop as deputy administrator.

Turbodyne to GE

General Electric Co. last week announced completion of final purchase of the Turbodyne Corp. and its Turbodyne poppet-turbine engine, confirming *Aerospace Week's* exclusive report of July 31 that GE "would take the Turbodyne" by purchasing the Turbodyne.

C. W. LeFevre, GE Aircraft Gas Turbine division manager, said that products included pistons, valves, and mechanical parts, and that GE would test and evaluate several engines built by Turbodyne.

100 Groups for AF

Joint Chiefs of Staff have asked President Truman for another huge increase in Air Force and Navy prime procurement for fiscal year 1953, at the beginning of a build-up of a 90 to 100 group Air Force, instead of the 60-group level presently planned for.

Navy prime procurement boosts asked would enlarge Navy air strength correspondingly, to equip and operate 12 large and 15 small aircraft carriers, as compared to seven and eight carriers now operated.

Prototype Bill Ready

Private law work by the House of the \$12.5 million air transport prototype testing bill virtually completed. Congressional action except for Senate concurrence is under immediate study, including one sponsored by the Air Line Pilots Assn. which would make organized labor representatives consultants in planning the test program.

AVITRUC —keeping ahead



World War II emphatically demonstrated the urgent need for versatile cargo aircraft. In today's military logistics, rugged assault transport planes, capable of landing troops and supplies in forward combat areas, or on short unprepared fields are basic requirements.

Avitruc is the result of combined research by Armed Forces and Chase engineers to produce an assault aircraft which meets these specifications:

EFFICIENCY

Standardized cockpit instrumentation provides simplicity of operation, facilitates training of new pilots and reduces familiarization time of experienced flight personnel.

SAFETY

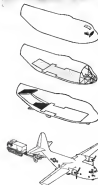
Steel tube nose, raised flight deck, and sturdy bulkhead between cockpit and cargo compartment provide maximum protection for flight personnel. Tie-down fittings each with 10,000 lb. capacity in any direction, on a 20" grid pattern in cargo compartment floor assure load safety, prevent cargo shifting.

ACCESSIBILITY

Power actuated, full width, low angle ramp gives access to unobstructed cargo space, permits fast, simplified movement of rolling stock, bulk cargo and troops.

PERFORMANCE

Avitruc will carry a useful load greater than its own weight. At "Exercise Swarmer" last spring, two Avitrucs landed, unloaded and were again airborne in less than four minutes, proving conclusively their value as assault cargo aircraft.



CHASE AIRCRAFT CO., Inc.
WEST TRENTON, NEW JERSEY

This Is Your Aviation Market

Your aviation market is larger now than at any time since the war.

Before next June 30:

- Contracts for \$7.5 billion will be let for new planes.
- More than \$4 billion in orders will go to subcontractors, material suppliers and vendors of parts.
- More than \$1 billion worth of aircraft will be ordered.
- More than \$7 billion will be spent by the Air Force on buying, maintaining and flying aircraft, more than \$3 billion will be spent by the Navy.
- At least \$2.5 billion will be spent by the two services on aviation equipment, some for new planes, the balance for operating, maintaining and overhauling existing planes, and for training.

The largest lump of government aviation funds, of course, will go initially to the manufacturers of airplanes and engines: \$4.4 billion from the Air Force, \$2.2 billion from the Navy, and \$1.1 billion from the Mutual Defense Assistance Program.

But your Air Force and Navy market goes beyond the purchase of new aircraft:

- Roughly 50 percent of the money budgeted for new planes goes to the airplane manufacturers.
- About 32 percent is spent for powerplants and propellers.
- About 13 percent purchases electronics installed in the planes.
- Another 1 percent buys the aircraft.
- Approximately 4 percent of the money is spent on instruments, landing gear, special handling equipment and tools, and the many other items peculiar to each type of aircraft.

In buying planes, all three except the airlines are "Government Furnished Property" (GFP) which the services buy direct and have shipped to the airplane manufacturers. In fiscal 1991 plans, GFP for new planes totals about \$3.3 billion, actually a little more than one-half the expenditures of AF and Navy on new aircraft.

► **Additional Purchases**—There is at least \$700 million more to be spent on equipment for existing planes, for training devices, for aviation, for ground handling and servicing, for meteorological purposes.

And fuel purchases will amount to several hundred million dollars. In its original budget, the Air Force requested \$130,070,000 for fuel and oil. That was before Korea. In its supplemental appropriations request, the Air Force did not disclose how much it was asking for fuel; the Navy did not detail its fuel purchases in either its original or supplemental budgets.

Weapons and ammunition will cost the services about \$600 million.

► **The Equipment Market**—The military aviation equip-

ment market is the most appealing for aviation business in general. Since the end of the war, less than a half-dozen new companies have succeeded in getting private engine or airplane production contracts.

By several years of ailing, the Air Force and Navy market for aviation equipment is more than \$2 billion, excluding fuel.

And it is a market for thousands of firms.

Reports of the Senate and House Appropriations subcommittees on the Air Force and Navy budgets spotlight some of the major equipment purchases planned under the original budgets. Detailed break-downs of all equipment spending were not included in the supplemental appropriations asked after Korea.

These reports, though preliminary, show the nature of military aviation equipment spending:

- Weapons and ammunition, \$800 million.
- Photographic equipment, \$12 million.
- Flight clothing, \$2.5 million.
- Shop and warehouse equipment, special equipment for laboratories, and other purposes, \$12.5 million.
- Meteorological equipment, \$83 million.
- Training equipment, \$23.5 million.
- Aircraft spare parts for maintenance and overhaul, \$195.5 million.
- Weapon spare parts, \$3.5 million.
- Engine containers, \$2.7 million.
- Catapults and RATOs, \$2.7 million.

These items total \$778 million. Add to that figure the projected Air Force and Naval Aviation inventory expenditures (page 65) totaling 1983 million. GFP for new planes, excluding armament and avionics, comes to about \$300 million.

That indicates that at least \$2.1 billion in military aviation equipment will be contracted for in fiscal 1991.

There's another way to get a fix on the equipment purchases. Roughly 15 percent of the new plane funds will go for equipment (the other 82 percent goes to airframe and powerplant manufacturers). That equals about \$1.2 billion. Add to that the \$778 million and non-GFP inventory expenditures of \$408 million, and you get total military aviation equipment funds of nearly \$2.4 billion. So the minimum market is \$2.1 to \$2.4 billion.

► **The Trend**—That is the equipment picture as it appears this only in the Air Force and Navy re-equipping program. A study of the services' requirements reveals some trends of what the future may be like.

- Overhaul and replacement parts for airframes and engines will be bought in greater amounts.
- Radio and radar parts purchases will increase.
- Training equipment expenditures will rise.

—William Kruger

What the USAF and Navy Will Spend:

\$11,541,611,298

Below are obligated expenditures under the 1991 fiscal year budget. Air Force's budget totals \$9,950,904,000, including pay and allowances not shown in table below. Naval aviation's budget, also including pay, totals \$1,573,969,000.

U. S. Air Force

	1949 (Actual)	1950 (Estimated)	1951 (Estimated)
Aircraft and related material	\$651,881,471	\$1,613,881,097	\$4,542,046,708
Armament	90,948,318	128,675,000	115,060,000
Control systems	113,946,619	16,250,127	27,700,000
Industrial maintenance	1,642,278	14,939,850	15,974,797
Special procurement (airports, vehicles, training and equipment)	28,422,863	\$21,835,000	605,000,000
Maintenance and operations	1,060,014,354	1,058,700,312	1,849,763,000
Research	21,891,835	263,46,136	12,214,000**
Development	137,629,819	128,318,381	128,776,540**
Operational equipment	7,618,245	14,577,093	37,490,000**
Reserve: Aircraft, maintenance and operations	24,357,611	22,378,079	38,731,619
Reserve: Facilities	34,041,638	27,695,091	39,358,488
RATOC	5,780,805	8,467,003	9,680,000
ANG: Aircraft, maintenance and operations	20,147,498	26,771,727	39,797,948
ANG: Installation, maintenance and operations	34,989,352	54,904,531	69,469,330
Total	\$2,046,228,721	\$1,287,568,291	\$10,232,123,148

* Excludes of an unestimated allocation from a \$70,000,000 appropriation made to the Secretary of Defense for industrial mobilization.

** Excludes of an unestimated allocation from a \$128,000,000 appropriation made to the Secretary of Defense for industrial mobilization.

Naval Aviation

	1949 (Actual)	1950 (Estimated)	1951 (Estimated)
Fleet aircraft procurement	\$12,447,138	\$14,002,124	\$22,543,000
Fleet aircraft procurement	11,221,671	11,708,000	13,000,000
Technical equipment for service training	1,248,468	1,458,300	3,200,000
Aircraft maintenance	5,924,630	2,447,800	51,800,000
Deliveries for new aircraft	25,544,117	16,556,530	40,741,600
Flight operations, regular	86,135,974	71,843,349	118,987,000
Flight operations, reserve	28,220,181	39,348,805	55,078,000
Aircraft overhaul, regular	945,271,687	14,281,879	14,848,000
Aircraft overhaul, reserve	44,252,497	49,744,194	41,865,000
Station operations, regular	229,977,621	180,976,211	127,736,000
Station operations, reserve	8,18,540	6,121,599	8,121,000
Supporting equipment, material and services	86,291,771	34,716,562	46,870,000
Research and development	118,000,000	77,851,414	192,700,000
Industrial mobilization	6,601,133	6,682,949	13,119,401
Total	\$996,754,471	\$1,679,591,773	\$3,878,646,491

Mutual Defense Assistance Program

	1949 (Actual)	1951 (Estimated)
Air Force:		
Aircraft and spare	\$65,471,668	\$1,051,682,379
Aeronautical equipment and supplies	23,399,419	46,438,738
Electronics and special equipment		65,173,562
Navy:		
Aircraft, spare parts, and aeronautical equipment and supplies	6,536,000	12,661,588
Total	\$95,467,097	\$1,171,844,705

board on the basis of pseudosuccess of business.

The Policy and Review Board sends out report forms to companies which, if later reason is indicated, have done enough business in a fiscal year to require renegotiation.

Under the renegotiation articles, it is mandatory that a contractor notify the Policy and Review Board within 30 days after receipt of a contract that has such a contract, but not previously reported under this ruling. If he has previously notified the Policy and Review Board, renegotiation is unnecessary and only contract status reports were both for himself and for the government agency.

• **Board Letter**—The recently revised letter which accompanies the forms mailed out by the Policy and Review Board states in part:

"The purpose of this letter is to obtain information which will enable the Military Renegotiation Policy and Review Board to determine whether renegotiation procedures should be conducted with your business.

"If you had gross receipts or amounts from renegotiable business which aggregated \$100,000 in any one year, you are required to file the required 'Standard Form of Contract Renegotiation' as required in each case this report must be filed on or before the last day of the fifth month following the close of your fiscal year.

"If your receipts or amounts from renegotiable business did not aggregate \$100,000 for your fiscal year you are not subject to renegotiation for such year.

"In that event, it is requested that you file the updated form entitled 'Statement by Contractor as to Non-Applicability of the Renegotiation Act of 1941'.

"Notwithstanding this letter, you may still participate in the renegotiation process. Upon the receipt of the 'Standard Form of Contractor's Report,' a determination will be made as to which renegotiation division should conduct such renegotiations. The filing of this report is in accordance with the requirements of Paragraph 422.222 of the Military Renegotiation Regulations."

Paragraph 422.222 of MRG, goes further requirements about the form and is supplied in the "kit" mailed to the contractor together with other applicable regulations and the basic law.

"This notice, however, and the top board have authority to audit the books and records of any contractor subject to the act, if they decide it is necessary after examining the forms returned by the contractor. The five-month deadline indicated in the letter for filing the report is set in absolute law, however, but can be extended by

the board if special circumstances are cited by the contractor.

• **Report Form**—The revised contractor report form is a statement of his estimated business for the year, gross sales, net income, and cost, and must be accompanied by a profit and loss statement, statement of surplus and also the balance sheet as of the close of his fiscal year.

To get the correct industry a criterion of what contracts are considered subject to renegotiation is the Roberts Board publication, periodically, lists of contractors and contractors falling under that category.

The lists are particularly useful to subcontractors and may be found in the Federal Register.

• **Separating Sales**—In preparing renegotiation involved in the board, one of the most important rules that a contractor has to perform is the separation of renegotiable sales from non-renegotiable sales. To aid the policy and Review Board in carrying out its methods for identifying contracts and subcontractors subject to the Renegotiation Act of 1941.

In separating sales, the board points out:

• **Contracts and subcontracts entered into before May 24, 1940, are generally not subject to renegotiation.**

• **Contracts and independent purchase orders not part of a blanket order and not in excess of \$1000 are not subject to renegotiation, even though several may be under the same renegotiable prime contract.** In other words, the fact that separate subcontracts and purchase orders (each for \$1000 or less) under the same renegotiable prime contract aggregate more than \$1000 does not subject such separate subcontracts and purchase orders to renegotiation.

• **All bills, regardless of amount, under a renegotiable contract, subcon-**

tract or purchase order, must be included in reports of sales subject to renegotiation.

• **Viscon-Trammell Statement**—One of the most important features of the current renegotiation legislation is that the profit limitation provisions of the Viscon-Trammell Act are expressly declared to be not applicable to any contract or subcontract subject to the Renegotiation Act of 1941.

The Secretary of Defense has delegated to the Secretaries of the Army, Navy and Air Force authority to exempt individual contractors and subcontractors from renegotiation. Strictly by his delegated authority to the Policy and Review Board to exempt contractors and subcontractors by general classes and types.

In order to carry out this authority, the Policy and Review Board has promulgated several class exemptions. Most important of these are:

• **"Collateral sale" exemption** This exemption covers all subcontracts for machinery, equipment or materials used in processing an end product or in item incorporated therein.

The exemption does not apply for the purchase of such machinery or equipment by the contractor from the government. The collateral item exemption ruling is due to expire on Oct. 1, 1950, but is very important to subcontractors preparing renegotiation data for periods prior to that date.

• **"Stock level" exemption** This exemption covers all subcontracts entered into on or after Jan. 1, 1949, and is for items customarily purchased for stock in the normal course of business.

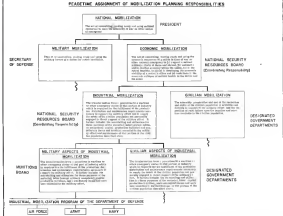
Contractors hold this exempt when such items are specially purchased for use in performing a contract at higher per subcontractor subject to the Renegotiation Act of 1941.

• **MRG**—Most important document issued by the government concerning renegotiation information is the packet entitled "Military Renegotiation Regulations."

The renegotiation price is \$2.98. For his information, the businessman gets a complete set of the latest military renegotiation regulations and any supplemental amendments to statutory regulations which may be published during the 12 months beginning Oct. 1, 1949. Not included in the packet are the number of contracts which are subject to renegotiation held by contractor on that date.

These lists are furnished to subcontractors in supplemental form as they are issued during the same period.

The Military Renegotiation and Policy Review Board cannot supply them, in all respects the regulations contained in a loose leaf binder must be obtained to the Superintendent of Documents, Washington, 25, D. C.



What Industrial Planning Means

An understanding of how it works should help you prepare your plant to get more defense business.

By Alexander McDowdy

Where does industrial planning come off and production start?

This question is being plied at the Air Force, Navy and Maritime Board on revised heads as they readjust their former plan to meet the needs of the Korean crisis and what may follow.

In simple terms the new planning problem for industrial subdivisions is this:

To meet the overall plan for all-out production, so that it starts from a higher basic production level—about three times as high as that of the pre-Korean level.

To do the job, the Air Force and Navy aviation plants will have to produce approximately \$40.6 million, on the basis of present plans, for fiscal year 1951 spending. This compares

with the \$18 million which was allocated under the original 1951 base budget.

Air Force share of the industrial planning funds will amount to approximately \$19.5 million, of which \$16.5 million has been added as a supplemental allocation. Navy aviation gets \$11.1 million, of which \$8.1 million was supplemental to the original budget.

• **Pre-Planning Pays Off**—From a planning standpoint, it would have been simpler to go from the pre-Korean level directly into all-out industrial mobilization (use to go to the production level now planned, somewhere in between) but is the "part-way" industrial mobilization gets started, the planners are

confronted with some situation. Now the basic planning they have been doing for the last several years is now paying off.

One current example is the contract which has just been signed for the Ford Motor Co. to make Pratt & Whitney R-4150 piston engines in the World War II Dodge plant at Chicago. This order alone is a result of planning contracts for license-borne agreements between Pratt & Whitney, and Ford, Bechtel and Nash to make this engine.

It is understood that all three of the automotive manufacturers selected plans for operating the Dodge plant as a separate source of the R-4150 engines, and that the Ford plan was selected.

Thus order alone is a result of planning contracts for license-borne agreements between Pratt & Whitney, and Ford, Bechtel and Nash to make this engine.

Key factor in the current industrial planning is the close cooperation which has been maintained between Air Force and Navy Bureau of Aeronautics to prevent overlap and duplication. Officers are that probably nowhere else in the Department of Defense has so much liaison and integration of progress been accomplished so successfully.

Thus it is a huge measure to the fact

Small Business

For purposes of military contracting, the Department of Defense is utilizing the Department of Labor definition of small business.

Small business is defined as a company whose aggregate number of employees is less than 500.

Department of Defense is now building its statistical analysis in preparation by the Department of Commerce which will spell out the difference between small and big business in more qualitative terms.

Department of Defense has no measure of its own.

that integrated civilian industrial planning of the Navy, Air Force and Army has been a reality since the World War II days of the Joint Aircraft Subducing Unit, an inter-service coordination group.

• **Package Programs.** Air Force and Navy decide their mission planning and package programs for specific aircraft. These programs are reviewed in cycles, to insure that new industry research and technical progress have not made them out of date.

But the joint-Korea plans have been thrown out of cycle by the new requirements which have necessitated a new look at many of the old plans.

Each package plan sets up the requirements for making a specific plane or machine compatible with the weapons it is to carry. The package plans are based on peak production rates required. Based on these, the potential production of each manufacturer for high volume production, and the current status of the design and development, complete plant assignments for subcontracting program, and requirements for plant capacity, machine tools and man-power are shown.

• **Modulation.** Details—Details of the expenditures to be made under the additional industrial mobilization budget are available in the supplemental appropriations act not yet firm. As a whole, to how the new funds will be expended, however, the joint-Korea Joint Force 1951 industrial mobilization budgets are helpful.

Air Force planned to spend \$10.5 million of its \$14-million total for industrial participation amounts as follows:

- **Mobilization** (preposition), \$3,747,057.
- **Laboratory contracts**, \$2,665,000.
- **Subcontracting operations**, \$370,000.
- **Basic studies**, \$100,000.
- **Manufacturing methods**, \$4,094,000.
- **Materials planning**, \$725,000.

Air Force continues to Joint Armed Services Medical Procurement Agency, \$11,619.

Largest other items in the budget were for maintenance of first reserve Air Force plants, \$1,054,000; and for maintenance and conversion projects on the Air Force machine tool course of 30,207 machine tools and 13,000 other related production equipment units, \$10,500,000.

Navy's basic 1951 industrial mobilization budget called for spending \$2,246,000 on direct contracts for production personnel, \$760,000 for industrial resources studies, 767,000 for machine tool preservation and repair; and \$118,000 for machine plant maintenance.

• **Supplemental Spending.** With military official program yet formulated for the

large supplemental industrial planning appropriations, it is still logical to predict that the distribution of funds will be somewhat as follows:

• **Subcontracting.** Supplemental contracts will get heavy emphasis. This field has been almost overlooked heretofore, due to the post-war mobilization budgets.

• **Steps to get into new improved manufacturing methods already developed** will have heavy emphasis, in larger volume production a call for Machine Tooling methods which would be in consonance with the small 21-plane-a-week production rate of June 1950, will quickly pay off when larger numbers of planes are called for.

• **Further research into manufacturing methods** will be called for. Last January, Air Materiel Command awarded 10 manufacturers' methods projects for investigation, but had to cut back to 40, because of lack of funds.

Such projects involve improved basic research and development, new high-volume tooling and production equipment and processes, aimed at saving man-hours and materials.

Further extension of license-to-license contracts may be indicated, along with careful evaluation of license reference agreements currently in force. Some of these previously disclosed by the Air Force cover such mobilization items as the Wright R-1330 engine for the T-33 North American trainer, General Electric's J-47 and Allison's J-35 jet engines, Curtiss and Hamilton Standard propellers, radio and radio equipment, jet control systems, bomb-sight systems, tail-fins, tail-ropes, and airframes of jet propulsion in the 1951 procurement program, in cases where licensing permits national products.

• **Materials.** Materials—Special attention is expected to go on the continued development of substitute materials for some of the more critical materials now specified in weapons and aircraft.

USAF's industrial planning division is part of the Air Materiel Command set-up at Wright Patterson AFB, Dayton, with a corresponding industrial planning office in the Pentagon. Ben Gen A. H. Johnson leads this division at Wright Field, and Col. Lee W. Felton heads the Pentagon office.

Navy's mobilization industrial planning office is part of the Bureau of Aeronautics in Washington and is headed by Chief R. M. Bevel.

Overall coordination for industrial planning, involving not only the aviation experts but other military personnel as well, is under the direction of the Joint Chiefs of Staff. The Joint Chiefs (JCS), assisted by the Joint Staff, Joint Board staff, and chairman of the Munitions Board Aircraft Committee.

Joint Procurement Simplifies Scheduling

Joint procurement, because of the economies afforded for government both in time and cost and in paper work, has steadily expanded and now covers 10 percent of armed services total buying requirements for major items.

The increasing 10 percent is controlled by the industrial structure for items of single-source equipment.

Ordered by action of the Management Committee of the Department of Defense last year, the Munitions Board now assigns responsibility for the purchase of all combined requirements to one of the three services.

Because of special requirements of the Air Force and Navy, purchases of services, aircraft engines and propellers are divided between the two services. However, to eliminate possibility of duplication the Munitions Board has worked out a system of cooperation within the aircraft and principal components.

• **Obsolescence.** All aircraft obsolescence control, with exception of a few special items, is performed by the Army for USAF, by the Army Aircraft Command, Dayton, N. J., and aircraft obsolescence is purchased by the Bureau of Ordnance, Navy Department, Washington 25, D. C.

• **Fuel-Pool** and all requirements of all three services are purchased through the Armed Services Petroleum Purchasing Agency, 1400 Pennsylvania Ave., Washington 25, D. C.

• **Photographic equipment.** All photographic equipment for the three services with the exception of medical X-ray film is purchased by the Air Materiel Command, Wright Patterson AFB, Ohio.

• **Medical supplies.** All medical supplies for the armed services are bought by the Armed Services Medical Procurement Agency, 1400 Pennsylvania Ave., Washington 25, D. C.

• **Hand tools.** Navy Purchasing Office, Navy Department, Washington 25, D. C. is charged with the purchase of hand tools, edge tools, such as axes, machetes' sawing tools and similar items for all three services.

• **Pipes.** Pipes for the armed services, including jet, steam, drain, oil, drying oil, petroleum and related products are purchased by the Navy Supply Office, Arlington Ship Canal, Potomac Avenue and Mather's Mill Road, Philadelphia 11, Pa.

Full details in procurement assignments of the three services are listed in "Munitions Board Plans at Military Procurement Office." Copies may be obtained by writing to that agency at Washington 25, D. C.

SELLING TO THE AIR FORCE

Where the \$4.4 Billion Will Go

Procurement plans call for 4485 new planes in 1951 budget; trend is toward more subcontracting.

By Ben Lee

The United States Air Force, with more money to spend than at any time since the close of World War II, is buying 4485 aircraft at a total cost of \$4.4 billion from its share of fiscal '51 funds.

While gross structure of the Air Force has not changed materially as a result of the war in Korea, there is an unusual procurement emphasis placed upon the needs of tactical air support vehicles of Army.

• **Background.**—In May 1948, Congress, in an effort to speed up aircraft procurement, granted USAF's departmental authority of \$100 million for aircraft procurement. The sum represented the requirements for the first year of an ambitious five-year procurement program. This action had been taken in line with recommendations of the Committee on the Joint Chiefs of Staff and the Congressional Armed Forces Board, which recommended a maximum of 70 groups.

In December 1948, however, the President ordered a cutoff of funds to finance only 48 groups.

By that time the Air Force had actually established 90 groups and planned for 70 groups early in fiscal year 1950. The Air Force problem then became one of reorganization, but not cut-back, in a 48-group level. To the surprise, struggling through postwar recession, it was a heavy blow.

This left Air Force, during fiscal 1949, with an operating force of 310 first-line combat aircraft, comprising 15 heavy bomber groups, 27 tactical light bomber and fighter groups, and 6 troop carrier groups. Funds were provided for 1951—actual force level 746 bombers.

In fiscal 1951 appropriations of \$1791 million was allocated to USAF for aircraft and related procurement. The supplemental budget granted USAF with an additional \$777 million for a planned and tripled previously planned '51 procurement.

• **AF Mission.**—Air Force procurement building for a 69-group structure is aimed at building a threshold machine.

• **Strategic aims.**—The Strategic Command of USAF, situated at the base of U. S. air power. This fact is reflected in specific contracts awarded Consolidated Vultee for B-36 bombers and Boeing Airplane Co. for the 6-jet

B-47D and the 4-jet B-47C, plus additional B-50D Superfortresses. Boeing bomber production now will run only through next year and beyond.

Procurement of the B-36 will round out previously announced strategic heavy bomber groups. Heavy procurement of Boeing's B-47 jet bomber makes an significant trend toward USAF's previously announced program for an all-jet force by 1954.

An Army policy shift is based on the assumption that the greatest defense to reduce aggression is the evolution of a strategic force capable of inflicting devastating damage sufficient to make aggression extremely unprofitable to any attacker.

• **Air defense.** Secondary mission of USAF in the defense of the U. S. from air attack. To meet that requirement, Air Force has placed special emphasis with North American Aviation for the F-86, with Northrop for the F-89, and with Lockheed for the F-90 and F-94, for a total of more than 1560 strategic planes and all-weather fighter aircraft.

• **Targets.**—An air defense force must know where to attack. Russia has studied the atomic attack, together with the constant shelling of the globe and the over-arming range and speed of its weapons.

• **Tactical aviation.** Third mission of the Air Force is the tactical support of land and sea operations. Adequacy of air mobility and tactical support of ground troops are long been fully decided by Air Force and Army. Air Force, prior to Korea, claimed it was providing all tactical support necessary within the limits of its budget. Korea proved the weakness of this line of reasoning.

As a result, USAF is making Republic Aviation, Inc. F-84 fighter bombers, and Lockheed for T-33 transport jet trainers and/or reconnaissance fighters, for a total of 10,000 planes to be used for tactical purposes.

To meet troop carrier needs, Air Force has added Fairchild Aircraft for a sizable number of C-119s and Chase Aircraft Co. a new version in Air Force contracts, is due for a considerable production order of assault transport.

• **Heavy lift.** Air Force has added Douglas for production of the C-97, and Douglas for the C-121.

• **Tanner.** In the inner field, Air Force has awarded North American a contract for a relatively quantity of T-28s, and Consolidated Vultee a contract for slightly less T-38s than was ordered in fiscal 1950. There are no additional in the contract awarded Lockheed for dual purpose T-33s previously authorized.

• **Air rescue.** For air rescue service USAF has added Glanville for production of the S-16 amphibious, Mosley for the H-19, and Fairchild for the H-21 helicopter. These assignments have been aimed for a total that should run to more than 100 aircraft.

• **Research and development.** USAF in fiscal 1951 is given \$185 million for research and development activities, of which approximately \$100 million will be spent on electronic search and detection radar equipment and weapons, mainly, guided missiles. The lion's share of the remainder is to be spent on computer research and development.

Weapons and weapon refinement are entering final stages of development, moving forward after a long-term lag due to design problems. Forward weapons development are jet-to-rocket and air-to-ground guided missiles and homing devices.

• **Tailhook Engine.**—Light emphasis on propellers, emphasis towards the jet engine, gas turbine.

Development of the tailhook and ducted fan engine had been curtailed by Air Force after World War II in favor of concentration on the jet engine. However, the Air Force has decided that Navy claims for tailhook engines and for propellers were not only valid but constructive in the high altitude environment.

• **Research.**—Scientific research as it relates to procurement in the Air Force is concerned not only with the application of the physical sciences to the production of efficient equipment, but encompasses the science of development.

That way USAF funds for research and development are considerably increased. Air Force can for the first time concentrate on projects which accelerate and to remain in development status because of lack of funds to bring them to successful conclusion.

Guided missile research and development has been more and more being centralized. Reluctant to discuss guided missile status, Air Force spokesmen have officially state that "a guided missile will soon become a part of the USAF weapons system."

• **Procurement Method.**—Two years ago the Air Force established a purchasing

quality questioned after successful job chasing methods used in private firm (see) known as the "vertical buyer" method.

With this system, primary responsibility and authority for procurement of a specific article is placed in the hands of a single individual qualified by special knowledge and experience. Every buyer is assisted by a cost analyst and a cost tract writer, and those contracts requiring approval of a higher authority are sent to a procurement committee for review before approval.

This streamlined system has enhanced itself to vendors because of its efficiency as well as to USAF because of its capabilities for assessment and planning.

Negotiated contracts play a major role, in course, in Air Force procurement in order to eliminate duplication of overhead and undue delay. Competitive bidding, however, continues whenever possible on lesser contracts and where it is assumed to be in the best interests of the Air Force.

Small Business Act. Air Force prime contracts eligible for prime contractor to carry every effort to subcontract work to small business. As a result of this program, small business firms have received upwards of 60 percent of Air Force contracts during the calendar year. Dollars was this not only appears easily 16 percent of Air Force prime contracts. The bulk of Air Force procurement money goes to big industries, major, profitable, and some of a smaller nature.

There is a pronounced trend in USAF government projections to place orders for plane equipment through prime contractors instead of direct government purchase. It is very important that this be extremely well encouraged by the military to eliminate procurement red tape.

In addition, with the growing complexity of the aircraft and the engine, manufacturers are being asked to supply numerous items of equipment which were previously "government furnished parts." This is the result, apparently, of the highly competitive position and the desire for the manufacturer to supply necessary equipment he feels necessary for the successful tested employment of his product.

Subcontracting by the prime contractor will increase considerably to include stepped-up production contracts made of prime-contractor by USAF. Production of aircraft is on the increase from approximately 100 planes to 120 planes per month for Air Force.

The increased production will be handled, Secretary of Air Force Francis M. Bostead, is cutting facilities. This means that that small business is due for a deluge of orders from the prime contractor.

Procurement Terms

- **Accuracy:** A supplementary device used in cooperation with an end item, contributing to the effectiveness thereof without extending or varying the base function.
- **Advance Time:** Represents the sum of the contract negotiation time, flow time, shipping time and lead time.
- **Assembly:** A unit of an end item composed of two or more parts fabricated together.
- **Attachment:** A supplementary device fastened to, or mounted on a nuclear, vehicle, apparatus, or other end item to vary or extend the function thereof.
- **Commercial Item:** An article designed for and available on the open market.
- **Contract Negotiation Time:** Relates to AMC only. Represents the time between the execution of a purchase request for a component until a definite contract is awarded. In those cases that require expedited action to place a contract to insure vendor's production on a basis other than a definite contract, such portions of those after TWX or letter contract is issued, will not necessarily with the vendor's flow time until a definite contract has been accepted. But to insure adequate time necessary for initial as well as follow-on procurement, the contract negotiation time becomes an integral part of the planning procedure.
- **End Item:** A unit which, in itself, accomplishes a specific complete function.
- **Flow Time:** Relates to component vendor's plant only. Represents the time between the date the component vendor receives his request and the time the component is completely fabricated and ready for shipment.
- **General Purpose Item:** An article designed to meet more than one application with a Government Furnished Part or Property (GFP). These items of equipment which, under the terms of an AMC contract, the AMC furnishes to the user as unmodified equipment is incorporated into end items being submitted for the USAF, under that contract.
- **Lead Time:** Relates to aircraft manufacturer's plant only. Represents the time between the start of the construction at the aircraft plant and the acceptance date of the airplane (or equipment) in which it is installed. Most of the AMC planning is based on acceptance schedules. Therefore, when end lead time data is expressed in terms of shop completion it should be adjusted for the difference between shop completion and acceptance schedules.

Lead time varies with the rate of production and during the different production periods, according to the following classifications:

a. **Pre-Production Period:** Represents the time between the date of the input of the first direct materials in preparation for production and the date of shop completion of the first article. (This period may relate to either component or subunit production.) During this time those rules place the establishment and stocking up of all assembly lines.

b. **Initial Production Period:** Represents the time between the shop completion of the first article and the attainment of the peak rate of production or "leveling off" point (maximum lead production rate).

c. **Peak Rate Production Period:** Represents that period from the time peak rate is reached until production is terminated or developed.

• **Licensee:** An individual, company, firm or corporation authorized by a licensor to use his proprietary design rights, manufacturing methods, or patents in the manufacture of articles offered for sale.

• **Licensor:** An individual, company, firm or corporation, holding proprietary design rights, manufacturing methods or patents, who enters into a written agreement whereby these rights, methods or patents may be used by other individuals, companies, firms, corporations or the government.

• **Modification:** The physical alteration of a special or general purpose item, as accomplished by joining a specific added component to the modified article.

• **Parts:** An individual piece of an end item, or assembly.

• **Prime Contractor:** A contractor who has entered into a written agreement with the government to perform work as furnish supplies.

• **Setup Time:** Represents the sum of the flow time, shipping time, and lead time.

• **Special Purpose Item:** An article or structure by design or physical character prior to an individual application.

• **Specification:** A description of the technical requirements for a material or item or a service, including a procedure by which the authority can determine whether or not the requirements have been met.

• **Subassembly:** A unit of an assembly composed of two or more parts fabricated together.

• **Subcontractor:** A contractor who has entered into a written agreement with a prime contractor to perform work or furnish supplies.



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figures of the ANAC Department of Procurement and Industrial Planning. Of a total strength of 4100, infantry and cavalry, 3600 were assigned to field installations.

Main job of a field office is to administer contracts after they have been executed at ANAC headquarters, but this involves a number of other tasks. Quality control of the products produced is supervised by contractors' inspectors, etc. responsible to Air Force inspectors. Insured contracts with money guarantees who are seeking Air Force business for the first time is made in the field office.

Field specialists for the Industrial Planning Division keep a close check on status of facilities and industrial mobilization potential in each area and property accounting is supervised in the field. A few field offices which have personnel aircraft plants in their areas maintain a flight operations branch, which directs flight tests for new airplanes purchased or used government planes that are reconditioned under contract.

How They Help—You probably would like to know how a small manufacturer can save money by using the regional field office or sub-office.

In the first place, it is not necessary for you to go all the way to ANAC headquarters at Dayton to find out about requirements for bids and contract awards or to quality in a USAF source of supply. Representatives in each field office are there to help the contractor in these performances. And lists of bid invitations, and other lists of assigned awards, are posted in each major office.

Sample bid requirements for contracts are available for inspection so that you, as a manufacturer, can see whether you need to enter competition on a specific item. If you do, and have qualified as a source of supply, you are instructed to write or wire for a bid list of your own, to Contracting Office, ANAC Wright-Patterson AFB, Dayton, Ohio, Attention NCIPFENT.

If you get a contract, you will have further dealings with contract officials at your field office. They supervise each contract to completion or termination, interpret contract clauses, and solve problems. USAF pays its contractors according to different ways depending on our contract term. Sometimes payments are made in often at several times a day.

Quality control of the products bought by the Air Force is one of the biggest field office assignments—approximately half of the field office personnel are in some phase of quality control or inspection. Consequently this work is always taking the manufacturer's inspection force and spot-checking it. A rule of use USAF inspector to 20 company inspection is common after a plant inspection system has reached a point considered justifiably satisfactory.

- HIGH SPEED SWITCHING UNDER LOAD enables the operator to change bright and dim lights without backing out of the runway lights.
- CONSTANT CURRENT REGULATOR AND CONTROLS are in ONE compact case requiring less panel space.
- SILENT ACTING DIMMER CIRCUIT PROTECTS the operator in turn in the cycle, thus reducing cable vibrations.



- INTERLOCKED RELAYS prevent short-circuiting of the windings.
- LONGER LAMP LIFE due to absence of brush arcing in lamps.

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CCRM—C.A.A. Specification US28, Sizes 7 1/2, 15, 20 and 25 KW for medium and high intensity series runway lighting control. One compact unit includes the regulator, brightness selector controller, open circuit protection and local control switch.

BCR11—C.A.A. Specification US11, Size 4 KW for direct control two three position brightness and runway selector switches, runway circuit breakers and positive-acting open circuit protection.

BCR12—C.A.A. Specification US12, Size 4 KW for remote control is equipped with electrically operated relays for high speed switching, and positive-acting open circuit protection.

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REGISTRATION CENTER at Air Materiel Command, Dayton, is the business man's initial contact with the Air Force's huge buying activity.

Where Air Force Does Its Big Business

Air Materiel Command, highly mechanized, is set to handle biggest buying job from over 1 million suppliers.

Dayton—The biggest aviation buying job since World War II has just been thrust in the lap of Air Materiel Command, purchasing agent of the Air Force.

It's a tough test of the industrial planning which has been developed in the postwar years. But because of up-to-date arrangements like the mechanized bid system, and specific industrial mobilization plans for key groups and equipment to be bought, AMC is in better shape to do the job. Top brass AMC generals say that the buying system is much better equipped to handle this volume of buying now than it was even at recently at one or two years ago.

But if you are a small manufacturer with a product to sell to the Air Force, you will find it harder to get started selling in spite of all these improved buying techniques, and despite the fact that the Air Force is eager to buy.

► **Logistics**—Most of your problems stem from the fact that there are thousands of other small business men who want to sell to the Air Force too, and they all seem to be putting in a sometimes excessive claim.

The result is that both in Dayton and at the procurement field offices of AMC, the Procurement Division personnel are pretty well swamped with initial inquiries from newcomers.

But if you really want to get Air Force business you'll "scent out" this initial fog, and you get yourself approved for the bidder's list for items which you are equipped to make or services you can provide.

To get yourself listed you must let your customer, the USAF, know that you have something to offer. Write a letter to Commanding General, Air Materiel Command, Headquarters, Wright-Patterson AFB, Dayton, Ohio, Attention: MC1170327.

(Actually, of course, Lt. Gen. B. W. Chidlow, the commanding general, won't ever see your letter, but just the same, that is the proper AMC way to address it.)

In your first letter ask for catalogs of specific items you would like to make. You will receive a little later some catalogs, listing in great detail the subunits and subassemblies of items which you have indicated you would like to make. Just mark the catalogs and send them back, together with information about your plant, your tools, facilities etc. And that's done. If your answers are satisfactory, your facility goes into the Air Force listings with the names of about 15,000 other manufacturers. Many issues are listed every month for different items. The total list of suppliers of various items, amounts to over 1.5 million listings.

Once you get your name on the list, you can sit back and wait for the Air Force to let you know that it is about to buy an item that you have indicated you can make. But, if you want to get some government business quicker, there are many millions of dollars worth of subcontracts which will be awarded within the next few months (page 85).

► **Subcontracts**—It is an advantage to have your name on the Air Force issue

list in a subcontract, too. Often a prime contractor will ask the Air Force for a list of firms who can subcontract his work. And frequently the Air Force will suggest to a prime contractor that he subcontract a portion of his contract, and will supply a list of subcontractors for his guidance.

But there is still no substitute for sales effort. Most good subcontractors get started and keep going, by selling their production capacities to the prime contractor in their regions directly, and you should not overlook this.

Negotiated contracts include those with major airborne producers, but in volume, which usually are of large dollar volume than the smaller just-in-time of maintenance parts or minor operational equipment.

Analysis shows that the Air Force does a much larger volume of business externally in dollar volume and in number of contracts by negotiating contracts than it does by advertising.

Here are some figures showing the distribution of contracts:

- In fiscal year 1950 dollar value of contracts let by formal advertising amounted to \$12,210,738 as compared to \$8,875,567,075 let by negotiation. This represented 5983 advertised bid contracts and 7340 negotiated contracts, or a ratio of 52 to 68 percent.
- In fiscal year 1949, advertised bid contracts had a dollar value of \$81,127,588 and numbered 8778, while negotiated contracts had a dollar value of \$1,273,741,814 and numbered 5426. Ratio was 34 to 66 percent.

It is easy to understand how the dollar volume of subcontracts let by the prime contractors for the 7340 negotiated contracts in fiscal year 1950 could exceed the dollar volume of the adver-

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Applicable AN specifications are met or exceeded. Initial cost slightly higher than screw-on fittings — But — save saved the first time used more than pays for the Inst-O-Matic.

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and bid contracts. And this condition, of course, emphasizes the importance of thorough coverage of your subcontracting opportunities.

► **Research Work**—Perhaps your organization has some skilled scientists or engineers qualified in research work. In that case, there are opportunities for Air Force research and development contracts for you to investigate. Once again the first step is to get your firm's name on a list of potential research contractors.

The first, write to Commanding General, AMC, Wright-Patterson AFB, Dayton, Ohio, Attention: MCHTNG 2.

Send brief (unclassified) information on your leading research personnel, information on your facilities and previous research work your organization has done, and if you have a booklet about your company's work include it. Later it may be advisable to follow up this preliminary contact with a personal interview, if you make an appointment in advance.

Problem of "qualified products" often arises selling to the Air Force in many cases, and if you are a new brand at Air Force procurement business, this is something else that you should know about.

► **Product Qualification**—Air Materiel Command has established standards or qualifications for many of the products it buys, and requires any items in these classes to meet these qualifications, before they can be bought.

When you mark your catalogs of products which are wish to make, you may indicate some products which are "qualified." In this case, AMC will send you a list of specifications for the qualified products, with instructions as to how you should take qualification tests.

It is a good idea to submit your product for qualification test before procurement starts. These instructions to present qualification testing of a product between the time a company is awarded and when the contract is awarded.

Actual buying at AMC is handled through a team of buying specialists, each handling the contracts for a specific plane, or type of accessory or equipment. There are more than 200 of these buyers.

► **Field Offices**—If you are a new seller of Air Force business, your first contact will be through the Contracting Branch Office, Room 002, Building 15, Wright-Patterson AFB, Dayton. But you can get much the same information at any one of the procurement field offices at Boston, Chicago, Detroit, Ft. Worth, Los Angeles, New York or Dayton, or at the two sub-offices at San Francisco, Cleveland, and other offices that now are being established.

How You Get Invitation to Bid . . .



1. CATALOGS are mailed you on request.



2. LIST of manufacturers is prepared.



3. CARD is made for street you checked.



4. ADDRESSOGRAPH plate comes from file.



5. CARDS ARE FILED by item code number.



6. POSTCARDS asking you to bid are mailed.



7. WHEN BIDS are to be sent, mailing gets cards covering firm in alphabetical order.



8. BID KEYS are mailed to you if you have returned the postcard.

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Handle fluid 25 to 40 inch lbs. at 3000 psi. With an internal diameter of 1/2", 3/4", 1 inch, 1 1/2 inch. Valve meets or exceeds AN specification requirements.



ADEL 3000 PSI SHUTTLE VALVE

When used or required all requirements of Specification AN-5-14, AN approved and -1, -3, -5 for AN 6290, 6217, 6217, 6218. All dash number variations covered. All AN drawings and sizes -1, -3, -5, -6, -8, 40 available.



ADEL 3000 PSI POPPET TYPE SOLID VALVE

Flow capacity ranges 150 to 400 gpm per seat. Greater than those required by AN standards. Pressure resistance is far less than AN requirements: 3000 psi. Class CD relief valve controls strictly in AN 6275 drawings.



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When used or required all requirements of Specification AN 6296. Tube OD 1/2", 3/4" and 1 inch.

Now design an entire aircraft, have low weight, larger section life, less maintenance, easy installation, characteristic plus advanced operating efficiency. Compare this outstanding hydraulic equipment with any other and see for yourself why ADEL valves and pumps are recommended for high pressure performance in Advanced Hydraulic Equipment. ADEL also has the most complete line of AN Standard Aircraft Claps and Clamps available. Write for complete equipment specifications.

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Mr. E. L. Tait, civilian assistant
to chief for production engineering.
Mr. C. J. Jacobs, administrative
assistant.
Mr. R. E. Walker, civilian assistant
to chief for contracts.
Capt. L. G. Ford, assistant to chief
for production & mobilization
planning.

Armament & Maintenance Branch:

Major J. R. Kern, chief.
Mr. J. B. Black, Major C. Carnay,
Major R. E. Lee, maintenance.
Mr. H. F. Powell, Mr. H. G. Fyher,
Mr. J. H. Oakes, Mrs. Mary C.
Elliot, spare parts.
Mr. R. B. Powell, Mr. R. W. Yates,
crisis.

Readiness Branch:

Lt. Col. R. W. Genthron, chief.
Major C. J. Chocoma, Major J. D.
Webb, Mr. J. B. Lutz, B-50.
Lt. Col. J. R. Markin, Major J. P.
Ferry, Major C. Snodgrass, Mr. J. K.
Maurice, Lt. Col. J. F. Walters,
B-56.

Major W. F. Nylande, Mr. F. J.
McDonald, Lt. H. W. Peterson,
B-45.

Capt. C. A. Madson, YB-57 &
YD-40.

Major J. D. Webb, B-52.

Capt. J. H. Shaffer, Capt. D. D.
Hickman, Mr. R. L. Stanley,
B-47.

Major John Velez, Jr., Mr. W. C.
Kerley, B-59 modification.

Fighter Branch:

Lt. Col. G. F. Kunkin, chief.
Capt. K. E. Beay, Mr. R. Con-
way, B-59.

Capt. E. H. Robertson, Mr. G. H.
Nolan, F-80.

Lt. Col. K. L. Garrett, Mr. Stephen
Lewis, Mr. F. A. Thompson, Mr.
Alex Corbin, F80 & F-84.

Lt. Col. J. F. McCarthy, Jr., Lt.
F. L. Robertson, Mr. W. F. Clegg,
F-84.

Cricket Missile Branch:

Lt. Col. H. Bove, Jr., chief.
Mr. R. T. Lawrence, Mr. R. E.
Connelly, as launched & into
mission.

Mr. R. T. Lawrence, Mr. C. H.
Nelson, under launch control.

Mr. J. E. Rice, aerial target.
Twelve, Transport & Special Aircraft
Branch.

Lt. Col. H. Bove, Jr., chief.
Mr. E. R. Goodlett, primary wing &
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So with modern flight. Although man learned to fly shortly after the turn of the century, it was not until the late 1930's

Measure of Safety

that flying—thanks to precision instrumentation—crossed to heavily-instrumented adventure and took on the aspects of an exact science. It was at this same time that the name of Kollsman became synonymous with precision flight—a position in the instrumentation field that has never since been challenged.

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Mr. L. E. Gross, Sgt. M. A. Beger, educational inst. property
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Lt. Wm. H. Wood, Mr. G. Fouchas, Mr. Wm. F. McNulty, Mr. H. A. Vin, Mrs. E. Duane, electronics
Major C. W. Kyp, Mr. N. Rue Johnson, Mr. F. E. Voss, Mr. R. W. Walker, aircraft, missile & power
Lt. D. E. McIntyre, Mr. H. A. Coldwell, Mr. D. E. Bayler, ground equipment & target
Lt. F. C. Loebe, Mr. L. E. Bales, Mr. E. L. Pappas, Mr. G. Perryman, photo, electron & metallurgical
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1701st Air Transport Wing, Great Falls AFB, Great Falls, Mont.
Hose AFB, Ga.
P. J. Bagg, N. C.
Greenville AFB, Greenville, S. C.
Shaw AFB, South Carolina
19th AF, USAF Technical School, Fort Rucker E. Warren, Wyo.
Chattanooga AFB, Bartlett, Tenn.
247th AF, Orchard Place Airport, Park Ridge, Ill.
Shaw AFB, Indianapolis, Ind.
240th AF, Barr AFB, Texas
Headquarters, 10th AF, Ft. Benning, Ga.
Wright Patterson AFB, Dayton, Ohio
101st AF Specialized Depot, Wilmington, Del.
Dayton, Ohio
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Buckner AFB, Austin, Tex.
Perry AFB, Sherman, Tex.
Waco AFB, Waco, Tex.
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Carnegie AFB, Ft. Worth, Tex.
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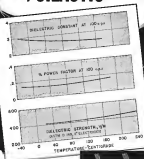
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- Class 28: Instrumentation equipment and training aids
- Class 29: Hardware and miscellaneous supplies
- Class 30: Publications, drawings, black films, tracing film
- Class 31: Foreign aircraft, related equipment and material
- Class 32: Aircraft and equipment for research or historical purposes
- Class 33: Miscellaneous items and equipment—posting passes, insignias, stores, gun equipment, clothing, supplies, mess kits, boots, tape, dental, medical and optical supplies.

Metal for Wood

A growing market is the Air Force in the metal engine containers. The service is shifting from wood to metal containers as fast as it can.

And although the original cost of a metal container is higher than that of a wooden box, LSCM serves in the end. At the beginning of USAF's fiscal 1951 budget, Brig Gen J. F. Early, AMC supply chief, estimated the cost of a metal container for an R-6160 engine at \$383. A wooden box for that same engine would cost about \$650. But—irrespective of an engine in a wooden box costs \$235 a year if the engine is in a metal container, cost is about \$10 per year.

The Air Force says it hasn't been using the metal container long enough really to establish the life of the container. But in 1947 it took some engines in metal containers and put them in an open field. Two years later the units were opened and the engines were ready for immediate use.



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directed, as in the past, by a three-pronged effort of Research and Development, Design and Engineering, and Material and Service divisions.

• **Research and development.** Under regular 1951 funds Navy was budgeted a total of \$199,359,000 for research and development. Of that amount, aircraft and facilities have totaled \$74 million. As a result of the revised '51 budget, basic and supplemental research and development was authorized \$218,751,000 of which aircraft and facilities get \$102,748,000.

The result is that Navy, toward last year to a cutback across the board in research and development, is once again passing for prototype development of new jet and helicopter aircraft, as well as increased emphasis on guided missile development.

• **Research—Procurement—Procurement** under Bureau of Aeronautics generally works in this fashion:

• **Experimental contracts.** The Research and Development division is headed by Rear Admiral C. M. Bolter. He is in charge of all experimental programs. Contracts for research and development fall into two groups—research contracts (those with no end product in sight), and development contracts (those which will call for an end product).

• **Development contracts.** Design and Engineering division is headed by Capt. R. S. Hartley. This division formulates the program for development of specific items required in a large scale production program. Aeronautic, electronic equipment, powerplant and airborne equipment are among the items controlled by branch staffs under the Design and Engineering division. Each branch division in its own individual requirements for item equipment.

• **Material and service.** When specific requirements have been established, they channel through Material and Service division headed by Rear Admiral W. D. Johnson. The division coordinates all actual procurement in the form of directives upon occurrence of Chief of Naval Operations. These procurement directives become, eventually, the sought-after Naval procurement contract.

Backer in Washington is the prime agency in buying Naval aviation's planes, powerplants and accessories. It coordinates an aircraft and other GPP (government furnished property) with the Naval Aviation Supply Office. NASO (see page 51) buys all spare parts and raw materials required by the Naval aviation maintenance program, and receives from manufacturers special orders for specific plane types.

Most Naval air procurement is accomplished through negotiated contract. Procurement of items such as air frames, engines and propellers, is based upon recommendations of special-

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Our business is everybody's business

America is involved in another emergency, and the nation is gearing for national defense. And once again, industry is demonstrating that the task of building material for our armed forces is not confined to a few major contractors. It requires teamwork by all kinds of industry — large and small. National defense is everybody's business.

Nowhere is the need for such teamwork more clearly recognized than in the aircraft manufacturing industry. But it is not teamwork desperately assembled at the beginning of a crisis and quickly disbanded when the crisis is passed. It is practiced in peace, as well as in time of emergency.

For example, Chance Vought Aircraft has been in the business of building military airplanes for more than 30 years. And in all that time it has fostered, as a matter of policy, a close working relationship with a large family of allied companies — large and small, but mostly small. They feed into our plant expertly-made components which we incorporate in the finished airplanes.

Some of these companies make such major items as valves, pumps, moldings, plastics, castings, landing gear struts, forgings, and hydraulic assemblies as Vought's designs. Others supply so-called "government furnished equipment," which includes engines, propellers, radar, cockpit instruments and all kinds of electronic equipment. Still others fabricate standard aviation products — sheet stock, rivets, machine screws and many others. We also buy goods and services, from electrical power to paper clips, essential in the operation of any business enterprise. Each company, therefore, is an integral part of Vought's business, however small its participation may be.

By spreading work among a number of companies in peacetime, Vought remains smaller than it would be if it were manufacturing about everything it needs. Therefore, its expansion or contraction as dollar volume of sales fluctuates, is not drastic. And since Vought is not the only customer of its subcontractors and suppliers, these companies are not seriously disrupted if our business slackens off.

In a national emergency, such as the one we are now facing, this kind of teamwork with little business really pays off. With such a dependable network of skilled subcontractors and suppliers, Vought is equipped at all times to handle, quickly and efficiently, any task that might be assigned by the military service.

In a national emergency, such as the one we are now facing, this kind of teamwork with little business really pays off. With such a dependable network of skilled subcontractors and suppliers, Vought is equipped at all times to handle, quickly and efficiently, any task that might be assigned by the military service.



The network of companies, large and small, which feed products and services into Chance Vought is nationwide.



Chance Vought is an important customer of more than 1,000 subcontractors and suppliers throughout the nation. Most of these are small, employing from 50 to 500 persons. Others are large, some much larger than Vought. Each has a product or special skill we need to help us manufacture missiles, rockets, precision products for modern, high-speed aircraft.



If you want proof of the interdependence of large and small businesses, take a look at the bottom side of the picture. Of every dollar received by Vought for airplanes, more than 32 cents is spent for the products of other companies — mostly small ones — on our production team. The amount paid out last year totaled nearly millions of dollars.

SHIPPING DEPT.



Companies which do work for Vought must adhere to extremely fine tolerances on some products. It is a matter of record that many of these companies, having agreed upon a code for quality production in aviation, are eagerly sought out by non-aviation aircraft manufacturers who want the same quality. This helps them to prosper in peacetime, and preserves skills and manufacturing techniques essential to our national defense in an emergency.

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at officers. Requirements proposed by these agencies for a specific case are usually so complex that the list of vendors who can comply with the established requirements is considerably narrowed.

► **Inventory Plus Popular**—In 1942 Navy established an inventory type contract which offered a manufacturer a profit premium for efficient production. Although the loss position, since this plan has continued to pay off.

It works in this way: Before procurement officials and the manufacturer agree on the best acceptable price, which includes a guaranteed rate of profit (if the manufacturer builds his plant at a higher cost than that specified in the contract that seems out a split between Navy and the contractor.

If, on the other hand, the plant is produced at less than the specified cost, the manufacturer is permitted 20 percent of the savings as a profit, over Navy benefiting from the remaining 30 percent. This may offset the manufacturer's losses, the larger his profit.

Navy Property

Navy property is classified by a management system similar to that used by the Air Force. This simplifies the accounting and keeping track of the many items purchased by Navy.

The manufacturer and inventor for the Navy know what classes cover their products. This will expedite his dealings with the government.

These are the Navy classes:

- Class 6: Anchors, bays, mooring buoys
- Class 8: Gages, patches, pumps, valves, relief ports
- Class 11: Compressors (pneumatic) and portable, pumps, including tools
- Class 13a: Cable fittings (loadings, turn buoys, shackles, etc.)
- Class 14: Composites, gaskets, lubricants, oils, greases
- Class 17: Electric cables, wire
- Class 26: Wireless communication apparatus and parts (radio, radio, power, including portable, test equipment, and accessories)
- Class 37: Aircraft and airborne lighting, batteries, fans, current heaters, switches, meters, warning devices, plugs, navigational lights, compass, practice buoys, stop equipment (general)
- Class 38: Photographic equipment and supplies, precision instruments, test equipment
- Class 21: Coal, fuel
- Class 22: Color and wire (non standard)
- Class 23: Emergency and rescue equipment
- Class 24: Dials, covers
- Class 25: Bins, receptacles, tables
- Class 27: Dry goods
- Class 29: Toilet articles

- Class 31: Lighting apparatus (non-electric)
- Class 32: Heat insulating material
- Class 33: Caskets, bins and fittings, partitions, rubber, plastics
- Class 35: Special clothing, related accessories
- Class 36: Buckles
- Class 39: Latches, physical
- Class 40: Machine tools
- Class 41: Blast tools
- Class 42: Handcuffs
- Class 43: Belts, mats, darts, screws, washers
- Class 44: Rigged tubing
- Class 45: Fabric and pipe fittings, hydraulic hose assemblies and fittings, valve, fittings
- Class 46: Metal bins, bins, signs
- Class 47: Metal netting, plates, sheets, signs
- Class 48: Aluminum alloy extrusions
- Class 51: Cylinders, chemicals, clean and spray
- Class 53: Aircraft lighting, compass
- Class 54: Fueling, marking materials
- Class 57: First aid and laboratory equipment
- Class 52: Fan extruders and parts
- Class 63: Tablets (general)
- Class 64: Cages (general aircraft)
- Class 65: Aircraft stoves, ovens, pilot applications
- Class 66: Machinery (cleaning and sewing machines, etc.)
- Class 68: Aircraft landing equipment
- Class 77: Anti-friction bearings, glass bearings
- Class 39: Aircraft, harness lines or (non pilot) (HETA)
- Class 82: Airframe structural assemblies, landing gear, ground handling equipment (HETA)
- Class 83: Aircraft accessories and components of hydraulic, fuel, vacuum and de-ice systems (including construction and pumps, tests and tubes, assemblies, batteries, and apparatus) etc.
- Class 84: Aircraft engine (components)
- Class 85: Aircraft engine parts but not equipment (piston, connecting rods and test equipment)
- Class 86: Aircraft pumps and components of carburetors, fuel, heating, electrical supply systems
- Class 87: Aircraft propeller systems, including propeller parts and tools
- Class 88: Aircraft instruments and automatic pilots and parts, tools, test equipment (pilot's instruments)
- Class 89: Ground handling equipment for aircraft (pneumatic, emergency, work stands, nose ladders, etc.)
- Class 90: Aircraft catapults, beams, arresting gear
- Class 91: Airships, light-to-air (LTA), components
- Class 92: Airship structural assemblies and loading gear (SEA)
- Class 93: Special communication systems and parts (pneumatic, electric)
- Class 94: Aircraft instruments, aviation instruments, aviation for control equipment
- Class 95: Buckles, gasket materials



Carry MAPCO Hot Food Ovens and Liquid Containers

SETTING new standards for service and passenger comfort, Capital's new Constellations leave nothing to be desired. Special planning in galley equipment matches the other functional appointments which so successfully distinguish these aircraft.

Mansfield Aircraft Products Company is singularly honored to have its Hot Food Ovens and Liquid Containers selected by Capital Airlines for service in its new Constellations.



Mapco Liquid Containers are an important adjunct to the improved food service of Capital Airlines.



MAPCO LIQUID CONTAINERS

Designed especially for aircraft service. Equipped with valves or built-in and lid lock systems for in-flight service or preparation at food centers. Insulated and hermetically sealed. Thermosatically controlled. This day as well as the cold tomorrow.



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Model "L" The Hardest Hitting Cecostamp Ever Built



Wider Range of Work:

The Model "L" Cecostamp can handle a wider range of work than previous models. This increase in striking energy is effected by increased ram weight.

Easier Operation:

Concentration of controls makes for ease of operation. Working area has been cleared of obstructing surfaces. Operating valve handle and control valve handle, worked together, run the Cecostamp and keep the operator safely poised for quick, accurate blow control.

More Accurate Operation:

Valve porting and valve seating give smoother, surer action, making it possible to strike under blows regardless of the height. The steel bolster plate makes for rapid die changes and more accurate setting of dies.

Greater Safety:

Operational hazards have been largely overcome. Controls are centralized for safety and ease of operation. Pivots-to-avoid bolts and springs are recessed in the steel, avoiding hazards to clothing. A safety cylinder head prevents damage from piston over-travel. Positive self-positioning safety gate, built into the side frame between the guides, hold the ram when changing dies or working between dies. Operating valve handle must be held down before throttle control valve can operate.

Lower Maintenance Costs:

New shock absorbing features have been incorporated to cushion vital parts, such as example, the Fabronite pads of the hammer-to-piston joints. Automatic lubrication of valve, cylinder and guides prolongs the life of these parts. Lubricator turns on automatically as soon as machine is operating. Valves are cast integral with the yoke, eliminating piping and air losses.

Write for a copy of Bulletin 33-2-13



CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.



Rear Admiral S. E. McCarty



Captain F. E. Hetter



Commodore H. F. Kiehl



Captain F. W. Houser

Your Navy Market for Spare Parts

BuAer decides what planes will be bought. To sell replacement items for those planes, talk to ASO.

Navy buying for new plane at BuAer, engine and accessories in the next 15 months is going to multiply. These orders scheduled for fiscal '51 are far above last year's.

And maintenance spare parts procurement will jump even more. Supply Depot—The Aviation Supply Office under the Navy's supply of spare parts for aircraft, plus standard Navy hardware. It is located at the Naval Aviation Supply Depot at Philadelphia, and is under the command of Rear Admiral S. E. McCarty, SC, USN, senior supply officer, and his deputy assistant, Captain F. E. Hetter, SC, USN. Admiral McCarty is also the commanding officer of the NASD, and Captain Hetter is the executive officer. Commander H. F. Kiehl, SC, USN, is the ASO executive assistant.

Responsible for maintaining proper stock levels of standard Navy aircraft this is the General Stores Supply Office, commanded by Captain F. W. Houser, SC, USN, also located at the Naval Aviation Supply Depot. Most of this material is procured through the ASO Purchase Group. Capt. F. W. Houser, SC, USN, is a change.

Total ASO and maintenance business this fiscal year will crowd a half-billion. ASO has more authority than any other Navy supply field experience. It makes about 90% of the parts procurement decisions for Navy aviation, based upon Bureau of Aeronautics delegated authority. Other Navy supply field offices make fewer decisions.

Regard step up for the aviation supplies will be as requested contracts. But public bid contracts will jump too, for aviation spares and general Navy hardware and commodities.

► Spare Parts Job—The three main functions of ASO on spare parts are: • Procurement of spare parts for new

planes. ASO orders the spares for all new Navy planes and engines.

► Re-checking spares for Navy planes and engines now operating.

► Fleet single-service procurement of spares for the Air Force from com-

panies has Pratt & Whitney and Westinghouse, over which the Navy has cognate.

ASO's purchases of general store material are for:

► All standard Navy hardware and raw materials.

► Single-service buying for Air Force and Army for certain commodities.

In spite of the big increase in new

ASO Buying Activity

Who buys what, how much, and on what type of contract.

ITEM HOW BOUGHT FISCAL 1950 CONTRACTS

(Procurement—Buying by Procurement Officer Don Care for new planes, engines.)

Aircraft*	Negotiated, prime	\$12,427,310
Engines*		
Jet	Negot., prime	46,476,809
Recip.	Negot., prime	8,352,809
Accessories	Bid, smaller	1,437,442
(standard)		
Equipment	Negot., smaller and bid, smaller	3,641,707
(miscellaneous etc.)		

(Annual Maintenance—Buying by Purchase Officer O. W. Stafford for Stock Contract)

Aircraft*	Negot., or bid, prime or vendor regularly supplying usually with contract	7,700,000
Engines*		
Jet		11,596,800
Recip.		6,612,800
Accessories		62,500,000
(standard)		

(New Hardware, etc.—Buying by Purchase Officer O. W. Stafford for General Stores)

Hardware and tool	Modify bid.	60,000,000
Miscellaneous		40,000,000
Total ASO Procurement Responsibility		\$286,114,530

* Airframe procurement here usually includes electric, etc., parts provided to type.

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Many do not know this study of their comfort and pleasure depends upon the skillful engineering that produced the LORD Dynafocal Engine Mountings that position these fine lines the vibration of powerful engines. But they do know that they are enjoying the most pleasant and useful method of travel.

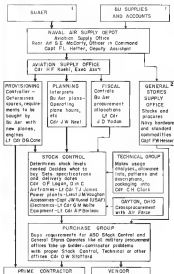
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NAVAL AVIATION SUPPLY PROCUREMENT



1. BuAer and BuAer's ASO is a major buying organization of technical parts for management control, depending on the particular command, ASD or NASD.
2. Dependent command under Col Hesser only, with ASD in that of report.

plans procurement and provisioning, ASD won't be buying much on an emergency basis. Most of the huge increase in ASD spare parts buying will be for stock. So, while ASD may want more delivery on order equipment purchases, it won't be ready to pay high prices. BuAer and ASD have reviewed their supply setup since Korea, and ASD has no real supply problems. New Procurement—ASD has perfected a system of buying from prime contractors enough spare parts with the original

airframe to maintain it during its planned lifetime. This is called prime buying. Engines and accessories pose more in trouble, but for shorter periods. The story of provisioning the Douglas F3D Skyraider (that contract just completed) shows how provisioning system refined and integrated by Procurement Controller Don Cook works. In September, 1949, BuAer sent a letter of intent to Douglas for development and production of 25 jet night fighters, designated F3D. The contract

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WARREN, OHIO



AVIATION SUPPLY OFFICE: Behind the door lies a half-billion dollar market

called for delivery by September, 1950. Spare parts for maintenance delivery by Douglas were budgeted at 25% of total contract value. This was the budget. But allowed Provisions: Cost for airborne spare and accessories and electrical parts provided. Ignored for accessories and electrical that are not standard on other type planes.

Because that original FTD program was not before Kees, the spare parts were to be of the type for maintaining the plane through a preventive opening life. That meant about 10 percent of spare parts cost was for maintenance requirements and 70 percent for overhaul. Warnings: spare provisioning raises the quote for maintenance parts (like exhaust pipes, tailpipes, shroud assemblies, sections) but overhaul items (like fuses and coils) are needed in less quantities. That is so because when planes are flying, their maintenance requirements are much heavier, but fewer planes get back home, so less overhaul parts are needed per new plane produced.

Planning Spares—Planning the provisioning list for the first FTD started well before completion of engineering drawings. The idea was to get manufacturing of spare manufacturing and delivery with original aircraft—this to save its cost and time.

One month before completion of drawings (February-March, 1949) General called a full-scale meeting of his FTD provisioning team. The team included airlines and civilian personnel of ASD, In-Box, and field-oriented activities plus fleet operating personnel, and Douglas and its vendor.

Provisioning Team—First the team called every part of the aircraft and accessories (21,690 items), using Miniparts 92 percent completed. Then the team figured replacement rate per operating plane hour (OPI) on five, covered replacement part—about 2800 (Maintenance and overhaul parts as what repair, crash damage parts are by used to be in applied from manufacturer plans). Then the experts decided who should supply what spare (J&H, Navy

manufacturer, prime contractor, vendor).

ASD set the number of each spare needed per plane. Stock Control took teams figured that from records on probable OPI life and deployment of the plane, according to latest statistics (lastest ASD Planning Office to Rucker and Fleet).

By late March, 1949, ASD had issued a complete spare parts list. Douglas then started production on the prototype. Full spare list was issued—increased—overseas—for 3-year life, three service tours and two major overhauls, which was the preventive life and deployment. (See chart, page 57.)

Over the next 12 months, provisioning schedules were under frequent review. About June, 1949, General called a final team meeting for the 25 plane contract. This was three months before delivery of the 25th plane (delivery was at three planes per month).

Repeat Contract—Items before ship completion of the first FTD 1, Douglas got a contract in September, 1949, for 10 more FTD-2s. The first increment of 20 was to start ship increments within four months, by January 9, 1950.

The new contract called for complete delivery, by Douglas and subcontractors, of spare parts with those 70 planes. That meant a provisioning team would have to meet in November—two months before starting fabrication. The team reviewed and revised for two days, planning spare parts at long-range but also the manufacturer and delivery schedules.

So right away, every group of Sky-Logistics delivered teams with a list of items originally scheduled to maintain the group a lifetime. The spares were worth one-third as much as the aircraft itself.

This ASD provisioning scheme used to get maintenance. Some confusion said the Navy planners could not succeed at this was. But they are all for it now.

Here is how the provisioning scheme can get. Not long ago the Air



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**PAN AMERICAN
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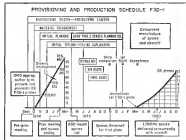
Pan American World Airways derives a double advantage from the use of Vickers Hydraulics, first, it has the best overall hydraulic equipment available, second, it obtains the many benefits of standardization.

Vickers Hydraulic Equipment has proved by hundreds of thousands of hours in the air its claims of longer life, greater dependability, better performance and lower maintenance. The interchangeability resulting from standardization means a smaller and more flexible inventory of spare parts, it reduces the number of test and inspection failures, it enables for quicker and easier training of maintenance personnel through the need for familiarization with fewer products.

Ask for Bulletin 49-53 describing Vickers Hydraulic Equipment for Aircraft.

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ENGINEERS AND BUILDERS OF ALL
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Force and ASD each submitted a provisioning list of spares for a new jet engine. The AF list was larger than the ASD list. But when the two lists got their supply technicians together, they found both lists were too big. Experience in this engine now shows the final AF-ASD listing was near perfect.

► **Engines.** Provisioning—Provisioning Navy engines, propellers and accessories is the same basic story. But with these the initial provisioning is for only a fixed period of time or for a fixed number of maintenance and overhaul cycles.

As with engines, initial provisioning is through the prime contractor. This is to insure proper coordination as technical changes come through. But after the first provisioning order, Stock Control maintains the stock level by quarterly requisition to the Purchase Group to make up stock differences. Purchase has quotes from the lowest bidder. Usually the low bidder on a stocking procurement is the original provisioning vendor, since he has the equipment already set up. Thus, Contractor A may subcontract exhaust stacks to Contractor B as engine provisioning, and from then on, Contractor B may supply ASD stacks of that item direct.

Top-level provisioning is based entirely on usage data. A constant flow of this is automatically collected and figured by accounting machines from Stock Control's quarterly stock control records.

Engine provisioning teams operate like the engine teams but control of the parts. They have every part right in the room with them.

► **Rushes spare buying.**—ASD managers buy their supply of almost all Naval aviation spare replacements from vendors on both bid and negotiated contracts. First job of ASD is to figure out how much it needs of every item.

The stock control officer completes five needs in line with latest usage factors and inventory level requirements.

ASD system stock control of engine parts is entirely operated by business machines and men. This is the only known automatic military supply system in the world. It even keeps track of hours between overhaul on every engine, along with all the technical things made on that engine. So spare parts procurement in this line is well-kept, intelligent, efficient.

Stock Control checks inventory against estimated use requirements. When there's a shortage, it issues a requisition. Final Officer Lt. Col. J. D. Yaden checks that the requisition is within the budget, then sends it to Purchasing Officer Col. O. W. Stafford.

► **Purchase Group.**—In fiscal 1950 the

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For 35 years Warner has been a leader in the aircraft industry. We've produced the most "Warner" in aircraft hydraulics.

Always it has passed quality and precision work of the highest caliber.

Now, reorganization has broadened our study into its research, management and production.

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You can expect even greater things from Warner—greater improvements, new products—

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YOUNG RADIATOR CO.,

speed, and when. It also finds how many wheels the other Comair outfit will need. Logan's men come up with final figures based essentially on these factors:

• Comair is advanced term biller, say, later in every OPI as they did before.

• The carrier will put into one of several forward bases.

All forward bases must stock twice as much as below, although only one of these bases will actually be drawn upon at once. (Doubtless, Navy can't predict which base a carrier will stop at, so ASO must stock them all.) The inventory insurance is introduced in forward bases. It is called the "pipeline supply buffer."

Upshot is that Planning tells Stock Control that the N. Pacific Comair squadrons will go ahead ship with a Z-day allowance of spare parts instead of the old Y-day. And the forward bases will need Z-day stock, instead of Y.

ASO Stock Control orders this into two sets of orders.

- Finish a-b-c Comair wheels immediately from stock, from Pacific Coast drops first, and NASID Philadelphia and NASID Norfolk later.
- ASO Purchase Group must buy a-b-c more wheels for delivery Dec. 15, and another a-b-c for delivery by June 1, 1951.

This is to bring stocks up to inventory required to keep all existing Car-

riers operating tactically now and for the planned combat life of the fleet thereafter. This is in accordance with the current deployment plan and down to Planning by Fisher and Fleet command.

• Buy spares—ASO Purchase Group will probably negotiate a contract for the first a-b-c wheels with the reader or prime contractor who can quote earliest delivery and a reasonable price.

But on the second a-b-c wheels, they may purchase and store a public invitation to bid.

How big an operation is ASO Stock Control and Purchasing? ASO handles several hundred thousand separate items, of which Comair wheels are just one.

Right now, ASO Purchasing is out to buy enough of everything to raise its stock level of these items to important level as dictated by the present operational situation.

How Long—Glad enough after Korea, ASO Stock Control had figured its new needs for almost all items.

By mid-July, ASO had already ordered items it knew would be short. And it had begun negotiations with vendors on many other items. Present stocks of all items are good for an average of one to two years.

With its big backlog demand now tabulated, ASO will buy heavily over the next 18 months. Maintenance spares will be its biggest demand.

Tips on Selling to ASO

- Follow standard procedure for military procurement offices.
- If you are not already on ASO Bidder List for items you can supply, write Purchasing Officer, ASO, Philadelphia 11, Pa., and state nature of items you are interested in supplying. ASO will furnish you necessary forms by mail.
- Bid on invitations, or else explain why you did not bid. Just a post card is sufficient.
- Do not go to ASO about mobilization plans. Mobilization is handled centrally by the Mobilization Board, Washington, D. C. For Navy products, Office of Naval Material, Washington, D. C. cooperates with the Mobilization Board.
- Do not go to Washington to get ASO business. It's all handled independently by ASO in Philadelphia.
- Do not ignore delivery dates and specifications in Invitations to Bid, and this applies to packing and packaging specifications as well as material specifications. There are contractual obligations. They mean just what they say—no more, no less.
- You are welcome to visit ASO, but if your only purpose is visiting a getting on the mailing list for bids, a letter to this effect will serve as well as a visit.

Commercial transport planes of every aircraft builder in the United States are equipped with

DYNAMIC AIR-BLOWERS

... used for introduction of hot and cold cabin air; defogging of windshields and windows; deactivation in critical areas; cooling of electronic equipment, generators, alternators, voltage regulators; air sampling for fire control and thermodynamic control; man-cooling and ventilation.

In 1942 Dynamic Air Engineering, Inc. designed and perfected the FIRST AXIAL FLOW BLOWERS for use as airborne equipment, and between 1942 and 1945 manufactured more than 50,000 axial flow blowers installed on military aircraft. Since 1942, this organization has been on that job to the exclusion of all other types of blower equipment, and with accumulated engineering time of over 160,000 hours.



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MODEL /M1525-2A

(2 stage) 27" x 26" DC. Rating 377
Brake-horsepower with shaft revolution
3,700 CPM at 4" static pressure
Diameter 14" Weight 45 lbs.
Dry unit only

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(1 stage) 27" x 26" DC. Rating 377
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3,700 CPM at 4" static pressure
Diameter 14" Weight 45 lbs.
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MODEL /M1525-2A

(2 stage) 27" x 26" DC. Special
modification of M1525-1A
Performance identical. Weight
320 lbs. Airflow 300 CFM at 4" static pressure
and cooling. Diameter 14" Weight 21 lbs.

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(1 stage) 27" x 26" DC. Special modification
from M1525-1A for heavy duty systems.
1,398 CPM at 4" static pressure. Diameter
14" Weight 45 lbs. Other information
on request

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Picture shown here is actual photograph of only a portion of the entire model inventory and not intended to show the entire inventory available. All unit ratings are shown without notes.

In many instances the modification of an active, proven model in suit your particular application problem will save days, weeks or even months of time. It will also remove most of the uncertainties which enter into a new installation. Proven performance with dependability and low maintenance cost is something more than expectancy for a premise — it is already shaken down — it is. More than 100 models of D.A.E. Inc. blowers are in service today on current aircraft. They represent 10 basic models with 90 modifications to meet particular needs or specifications. A few examples of "engineered" and modifications are shown here. Modifications to suit your needs are available.

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Diameter 14" Weight 45 lbs.

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(1 stage) 27" x 26" DC. Rating 377
Brake-horsepower with shaft revolution
3,700 CPM at 4" static pressure
Diameter 14" Weight 45 lbs.

These small 27" diameter blowers can be made to any of a number of bearing configurations to suit light type applications.

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Continental Air Lines
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Eastern Air Lines
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SELLING THE AVIONIC MARKET

Avionic Spending and What It Buys

	1949	Fiscal Year Budget 1950	1951
AIR FORCE			
GPP for new planes	\$62,000,000	150,000,000	490,000,000
Other (incl. Research & Development)	117,400,000	206,075,500	250,000,000
Total AF Avionics	179,400,000	356,075,500	640,000,000
NAVY			
GPP for new planes	32,000,000	55,000,000	175,000,000
Ship and shore (BuShips)	15,800,000	16,000,000	75,000,000
Other (incl. R & D)	27,150,000	18,241,000	75,000,000
Total Navy Avionics	74,950,000	89,241,000	325,000,000
CAA			
Establishment savings	22,400,000	37,476,000	21,500,000
Test & evaluation	1,650,000	1,650,000	1,650,000
Total CAA Avionics	24,050,000	39,126,000	23,150,000
OTHER			
Defense Dept. R & D			49,900,000
Air Navigation Development Board	100,000	7,000,000	5,365,000
Research of Standards	3,847,170	3,100,000	3,150,000
Submarine Avionics	1,900,000	3,500,000	5,000,000
Civil Aircraft	900,000	1,000,000	1,500,000
Export	1,900,000	1,500,000	2,000,000
Total Other Avionics	6,147,170	16,100,000	27,915,000
Total Avionics Procurement	303,779,970	500,722,890	1,062,915,000

Bigger Opportunities for Avionic Sales

Natural growth of requirements, plus defense needs, plus possible allocations makes billion-dollar demand.

Procurement of avionic, electronic and electrical equipment makes up one of the fastest growing markets in the U.S.

In this fiscal year (1951) avionic purchases will exceed \$1 billion—double last year's figure and three times that of fiscal 1949.

And new demands by the military may push this year's total even higher. Small business gets more than one-third of total avionic money, or nearly \$300 million this fiscal year. About \$150 million of that should be spent with small firms that have not figured in avionic production before.

The combined impact of military orders and the television boom has brought a severe shortage of standard components, such as tubes, relays, transistors and resistors. That is creating production schedules of price contracts to the military services.

► **Allocation Ahead.** A typical piece of avionic gear for the Navy Station of

Avionics is about 15 percent (by value) standard components, 47 percent special parts, and 48 percent labor, assembly and overhead. The shortage of standard components means just one thing: allocations to civilian producers soon unless there is an unexpected gain in capacity. With allocations, manufacturers of both finished products and sub-assemblies must cater to military business as well as a civilian clientele.

The Air Force and Navy have taken the shortage complaints of their prime contractors to the *Missionary Board*. The Board now is under great pressure to allocate source parts needed by various contractors and subcontractors.

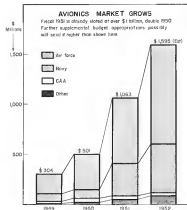
Resistor and tube manufacturers are operating at full capacity, with deliveries of resistors in 25-60 weeks. Condenser output is at capacity, but still at short supply.

The standard components group is the only bottleneck now, and it is the

only potential bottleneck in case of mobilization. There is no worry about capacity of fabricators of finished avionics and sub-assemblies.

► **Air Force Spending.** Money now is allotted for avionic procurement and research and development contracts in fiscal '51 totals about \$1.5 billion. Air Force will spend about two-thirds of the billion-dollar total, or \$950 million, \$440 million of that is Government Property for new planes. Ground equipment and outfitting of old planes will come to \$208 million (VHF avionics unit, IFF, Navigation, and the radio receiver included). And another \$50 million in avionic is slated for replacement items and miscellaneous "barred items." (Avionic equipment not readily identified as such in budget figures).

Small business will get about 20 percent of that money—or maybe \$150 million. Air Force buys with large quantities that larger corporations get a bigger share of. Air Force contracts than they do from Baker. (Baker women speaking gets about 50 percent to small business. Its quantities are smaller.)



► **Navy Spending**—Navy will see about \$225 million of increase, roughly half the Air Force budget. BuAer will spend about \$250 million of the \$175 million for GDP for new planes, 450 million to refit old planes and other nonaeronautics spending, and about \$25 million for spare parts.

Bureau of Ships and Bureau of Ordnance will spend nearly another \$75 million, most of it for ship and aircraft repair and communications gear.

BuAer lets about half its contract value to firms supplying less than 500 BuAer estimates about 15 percent of its prime contracts go to small business. So there is about \$140 million in new contracts waiting for small business.

► **Research and Development**—Research and development budgets for the navy are secret now, so you can't tell how much will be spent overall in research and development of aviation devices. But in the supplemental Defense Department budget submitted after the start of the Korean action there is \$144 million set aside for all kinds of research and development. It is estimated that 540 million of that sum will go into aviation. That is in addition to aviation research and development included in the regular and supplemental fiscal '53 budgets.

Research and development work is wide open to small firms. If you have a small but excellent engineering or scientific staff, you stand to do well of via go to the various agencies spending money on research research.

One small firm with a top notch staff right now is doing a \$100,000 annual business with BuAer, yet started with staff of \$10,000. That is an extreme example, but still it gives an idea of what can result if your staff has special knowledge of some phase of aviation that is needed in the research and development program.

► **Chances for Business**—The big jump in aviation business spending offers a good opportunity for many companies now doing little or no government work. On the new types of gear being added for, almost all potential makers start over in the race to get contracts. Only the original developer has an edge in tooling and experience in that piece of equipment. And often the holder of the development contract has the capacity necessary for volume production.

That's one reason an aviation firm ought to get after government business now. Here's another you need a better general full-scale production, that would lay off materials for your civilian

production. To get listed with the Munitions Board and scheduled for production work, you have to have the recommendation of one of the procurement agencies. So it's best to start right now trying to get government business contracts.

You'll get a sympathetic reception. Procurement agencies have been working hard to get more firms to bid on aviation contracts. Price is only part of the buyers' problem. What they want more than anything else is a reliable product—one that can be counted on never to fail in the air when the pilot needs it.

If you can make a reliable product, the procurement agencies want to hear from you. They may stop inviting in other firms to bid if your product proves more trustworthy.

► **Caution Wanted**—You can get a thoroughly precise sometimes in certain aviation items. If your product on a standard type article is accepted after testing, you are put on the "qualified products list" for that item. Then demand for it will come automatically from the Air Force and Navy directly, and from prime contractors doing work for them.

On many items, including types of engines, transformers and tubes, there is only one single supplier on the "qualified products list." But the procurement agencies hope for more competition. Since items that are nearly monopolies as far as military aviation procurement is concerned could easily be made by companies other than the ones that are listed. All they have to do is make a case to specifications and get it approved.

Because of greater secrecy, plus secrecy, most aviation business is on a restricted, negotiated bid basis, instead of being publicly advertised. Thus, more potential competition are automatically excluded from the market if this basic rule takes the market is working out the government agencies and their demands.

► **Capital Available**—Some firms fail to get into military aviation business because they think they do not have enough working capital to take on a real military production schedule in addition to their commercial work. But under the Assignment of Classes Act, you can get a loan for government work.

That act makes it possible for you to obtain a loan from any specified financial institution by mortgage your patent interests by the government to the lender. Also, the Reconstruction Finance Corp. may help small firms. ► **Chief Bureau**—Aviation business runs by Air Force, BuAer, and BuAer. That is the present set-up. Over the long term, the Civil Aeronautics Administration, the airlines, and other

Shooting a bird...

IN THE AIR AGE

"Tiers in 'shooting a bird' at the U.S. Naval Air Missile Test Center, Point Mugu, California.

The "shoot" is the launching of a missile, while the "bird", in this particular case, is the Fairchild CTV-N-20 guided missile.

In a matter of seconds the missile is hoisted high into the atmosphere with a deafening roar, propelled by its reaction type motors and auxiliary boosters. Separation of the booster occurs as the missile speeds higher and higher into space, stabilized and controlled by the "zero-gravity" of its electronic guidance systems.

Soon the hovering crowd and ground observers no longer see the missile... but its path is being carefully plotted as it heels toward its target... now under its own homing control.

Then "shooting a bird" is but one phase of the Lark project. It is an operation requiring split-second timing and perfect coordination. It is the result of teamwork between the Bureau of Aeronautics, Navy Department, the Naval Research Laboratory and Fairchild engineers and represents a combination of the best in aerodynamic design, electronic controls and precision manufacturing.

Here is another example of a Fairchild free and of "shooting a bird"... in the Air Age.

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ment Board of the Defense Department, as well as the Navigation Fund of CAA and civilian agencies. An all out war mobilization would mean research facilities would be jammed. ANDS would use its power to assign projects to the most immediately useful ends, often stopping long-range projects to get immediate ends finished and started. So it's well to know what types of equipment will be needed.

Transition Program-Hire are the near-term equipment projects that ANDS is working on for CAA and the military.

Study of airport interurbanization tech-

niques—completed Specifications for developmental models of the equipment are being written. This project will have to do with another program under study—high-pink planning equipment.

Development of R/T radio transponder and associated ground components is being speeded up. Twenty airborne units and one complete ground station are scheduled for delivery next spring for evaluation.

Development of airport surface detection equipment (ASDE)—Terminal Area Evaluation Center will evaluate developmental model next month. Contract for development of engineer-

Major Buyers Of Avionics

Air Materiel Command, Wright-Patterson Air Force Base, Dayton, O.—Air Force airborne and ground electronics and electronic equipment.

Wahcon Laboratories, Red Bank, New Jersey—Research and development equipment and contracts for ground installations.

Bureau of Aeronautics, Navy Department, Washington—Air borne equipment and research and development contracts.

Bureau of Ships, Navy Department, Washington—Complete units and major subassemblies, shipboard and ground radar and communications.

Bureau of Ordnance, Navy Department, Washington—Aircraft fire control radar and communications.

Naval Electronics Supply Office, Great Lakes, Ill.—Spares parts and smaller components for fleet equipment.

Naval Aviation Supply Office, Philadelphia, Pa.—Spares parts and components for fleet equipment.

Naval Signal Corps Procurement Agency, Philadelphia, Pa.—Procurement of some ground equipment and research and development for Air Force.

Procurement Branch, Civil Aeronautics Administration, Washington—All civil aviation procurement, also procure and install some for Air Force and Navy.

ing model is already let.

Down-bearing database evaluation progress is complete. It is about ready for production, but some distribution has been found to occur at low altitude near rough terrain.

Evaluation of Navicomp will show the great control efficiency that is possible with safety service layout. Within two years controlled Navicomp displays will be ready for installation.

Development of packet conversion is under way on three different types. These will show a line on a chart, giving the pilot a continuous picture of his position and course.

Many more projects involve modification of existing gear. Among these are development of directional VHF localizer array, moving target indicator, and 300-line ground master indicator, a modification of ground DME.

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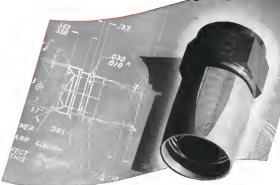
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GUIDED MISSILES

A Growing, But Exactng Market

Guided missile construction demands new and delicate skills. If your plant has them you are needed.

By David A. Anderson

Colded missiles have turned out to be a different breed of cat than airplanes—much to the annoyance of the aircraft manufacturers who are in the fix of building dog chugs.

Some of the annoyance can be reduced by subcontracting the job to manufacturers who have the specialized skills needed to turn out missiles. But one drawback has been that many prospective subcontractors don't know that they have the tools or skills to do the job.

And the reason for this is a necessary anti-missile security.

That's one factor that is going to make it difficult for subcontractors and prime contractors to get anything accomplished in their first few months. The prime contractors can't tell much about the missile until the subcontractors personnel are cleared to receive such information.

The subcontractor, quite frankly, may not want to go to the trouble of getting cleared until he can see what he is going to be working on, and judge whether the game will be worth the candle.

New, we're about ready to build some missiles.

But what kinds? How big? How heavy? What weapons?

To answer these questions, it is necessary to explore a little about missiles in general.

► **Class Status**—It would seem that in the United States, interest centers almost three general classes of missiles.

► **Boat-launchers**—Typified by the German V-2.

► **Anti-aircraft**—Exemplified by Boeing's Geko, or Ordnance's Nike.

► **Anti-ship**—To be used by fighters and bombers instead of the more conventional machine gun or cannon.

These categories also serve to divide the missiles into two groups. Boat-launcher missiles are big. AA missiles, machine-gun, anti-ship missiles, tend to be smaller.

Further division into great and epic can come. Missiles can be supported by lifting devices, or not. They can have rocket engines, jet engines, turbojet engines, or no engines.

They can also fly at supersonic or subsonic speeds, in the atmosphere, outside of it, or in both places during their brief lives.

In short, they are a different breed of cat.

It isn't possible to talk much about specific types of missiles. But suppose that a couple of representative varieties of missiles are explained in some detail, as examples of what might be.

► **Two for Boasting**—Boat-launcher missiles are currently covered as one of two types.

► **Ballistic aircraft**, probably subsonic, powered by a turbojet, flying within the atmosphere, possessing no new problems.

► **Artillery projectiles**, probably supersonic, powered by rocket motors, flying through the atmosphere and outside of the atmosphere, possessing lots of new problems.

In the former category, the missile manufacturers are at least. They and their usual subcontractors can handle the job very nicely.

There is a strong need in the artillery-type missile, though.

► **Study an already**—manufacturers receive a stack of blueprints. After his staffs have studied them for several weeks, they find that they are to build a 59 ft-long, 5 ft-diameter rocket-powered missile. From its sharply pointed nose to its blunt tail, it is covered with gleaming stainless steel skin. Its ribs (or bulkheads or frames) are stainless steel. There are stainless steel windows. The deck has holes two large tanks for fuel and oxidizer, a framework for the rocket motor, electronic gear, a workbed.

The bill of materials reads aluminum alloy, stainless steel, copper, platinum, carbon, cold-rolled steel, pure aluminum, wood, lead.

The 60-in. loading cranes are to be held within a connectivity of 4-in. Tall sections are to be aligned with the centerline of the missile within 0.1 deg. Thrust line through the quarter must match the missile centerline equally well. The outer skin must be polished—mill finishes are not acceptable. All joints must be both joints, with not more than a 0.01-in. gap.

To the manufacturer, who may have been building farm equipment, that all comes as somewhat of a shock.

But it is all necessary, to wing the brief drop of perfection out of the inside.

Tail surface alignment, for instance. When the missile plunges towards its

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largest at the surface of the earth, it is shivering along at supersonic speeds! It is not being controlled through shock waves, because its fast (and then faster) power source for auxiliary thrust was conceived long before. It falls freely, kept on its calculated course only by the weathering action of the tail fin. They have to be set so exactly, to avoid bucking in an engine due to aerodynamic forces caused by misalignment. And they have to be consistently accurate from nose to tail, to keep the depressor pattern of water steady and.

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Besides the obvious reason that it is always good to have few things, there is another good and sufficient reason for simplicity.

Made design is basically common sense—we know as little, even yet. Aero dynamics have to work in a pocket of air where there is no air, and perfecting requires a lot of time, even the experts disagree. So, to be safe, the aerodynamicist is careful. He specifies low drag brackets, because he knows that if the nose does not meet its performance requirements, somebody is going to come right back to him. It is a form of insurance, this external vulnerability.

Consequently, of course, more than two men made by different methods have and make, will not have a drag-producing bump or ledge. So far aerodynamics, as well as interchangeability, close tolerances in construction are demanded.

• **Redundant Main**—In this basic structure, most perspective specialists for subcontracting are anxious of the airplane—the instrument at control compartment, the collection, the tail fin or tail cone.

There's more to the nose than meets the eye. Underneath the skin of the control compartment, there are precision gyros, for control, integrating accelerometers, for power regulation. They might be a data base for tracking, or command receiver for guidance linkage. This is the tail—of the instrument manufacturers and the specialty machine tools.

Further back, in the main body there are tanks for fuel. They are built to be spooling staff, pure aluminum, E-Metal. But basically, these tanks are present vessels and they can be made by suppliers to the chemical and foods industries as they can be made by their own shops.

In the tail, the motor is made of

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machine parts. The head, which as facts and evidence into the combustion chamber, is a machine job without peer. In fact, most of the motor parts call for extraordinary skill in machine tool work, possessed only by master toolmakers. Then, there is another possible set of complications—precision machine shops and toolmakers.

Throughout the structure, stainless steel has to be added. The valve has to be ground, to reduce drag, but has to maintain full strength, equivalent. Many of these valves must be precise right up to two atmospheres. And to comply with stainless steel welding, particularly on thin sheet stock, is not considered in that country.

In the sheet metal work, progressive rolls are necessary. Sheet is run up to 14 in. width and to 4 in. thickness will be handled.

P. Vals-Senoff Machine—So far, only one case of trouble has been covered. Now is the time to try something about a hypothetical automobile valve.

Chances are that this one will be powered by a swept engine, that it will have wings as well as tail surface that it will be about 20 in. long, 2 in. in diameter.

Again, difference between this one and the bombarded machine is that the swept engine requires an intake valve in operation in the region of the atmosphere.

Popularity, and quite economical, for engine has been called the "Flying Sloop" — It isn't really a sloop as all that.

The best flow process sounds simple — a valve in the head and, compressed by the forward speed of the intake, raised with fuel, raised in a combustion chamber and pushed out the exhaust nozzle.

Exhaust velocities are as the order of a few hundred feet per second, not velocities, actual speeds.

Just above for a swept engine might be about 60 inches like per oz. per lb. one tenth of that is high for an ordinary engine.

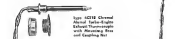
The air that goes through the nozzle must be handled up as carefully as the air which passes over the outside. This involves production and manufacturing precision.

Now, all the lower portions must be glass smooth, with the possible exception of the combustion chamber. Previous records about fuselage, tolerances and concentricity hold even more stringently.

As an example of a possible test used for the typical aircraft, an subcontractor recently suggested, that the way to build a particular swept wing to make it work over thick skin, assemble it and then set it between centers on a

THEY MEET

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United States Air Force Standards are met by every South Wind aircraft heater, regardless of whether it is built for military, commercial or civilian use. Rigid government acceptance is achieved before any South Wind heater leaves the plant for aircraft installation. That's why manufacturers of the nation's leading aircraft depend on South Wind heating equipment for aircraft safety, maximum efficiency and minimum maintenance.

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South Wind

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THERMAL ANTI-ICING EQUIPMENT

grinder and grind to external contour. Such a procedure, while expensive for one ramp, would be reasonable for many. In fact, it was considered necessary to search the requirements of flow conditions. It elements, part inter changeability, but inspection was still not to compromise in that one. They had already decided to use selective assembly of parts for their ramp, anyway.

► Epilogue—That, in as much detail as is possible, is the beginning of the story on looking missiles.

Each class will have its special problems. Nothing was said about air-to-air missiles, for example, where the skilled mechanic will have to be a watchmaker to be able to fit everything into a 1-in. diameter body. And nothing has been said about the difficulties of working on tubes such as the German did (puls something like 50 percent splash) in making rudders to operate inside the hot exhaust blast of the V-2. Or about any of the myriad tasks confronting the technician of born mechanics, grinding, welding equipment or track loads as they appear on balloons, balloons and probes, that they were not had.

The missile program will call for redesigning and re-evaluating substructures on a scale never before seen.

Missile Market Starting to Grow

The extent to which guided missile development and production has to be increased was sharply outlined by Major Gen. Carl Brandt, Air Force director of operations, in testimony on his department's expenditures.

"Guided missiles and the ground," "after carefully from other combat weapons in many ways. Guided missiles have virtually no history. There are no guided missile combat organizations today. We are just beginning to train the instructor who can train the service to man these organizations."

"It is apparent that missiles... should be produced as soon as research and development supplies a missile that appears suitable."

Although Air Force experience with guided missiles, as Gen. Brandt pointed out, has been limited, testimony on the expenditures he showed that there are more contractors available to the missile than parts market. Depending on the complexity of the missile, the spare parts requirements will be from 10 to 25 percent of the original cost of the missile. Some parts and for the electronic parts of the missile will run higher than 25 percent of the original cost.

ENGINEERS' NOTEBOOK



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Director, Subcontract Department. It will be mailed to the proper office.

There are good points for the subcontractor to cover in the opening letter:

- Type of work he is prepared to accept to do
- Type of work he produces but can't do
- Machinery, tools, gages and inspection equipment in the plant
- Special skills possessed by his personnel
- Capacity of plant for production of the subcontract, and room for later expansion
- Previous experience with aviation

products and processes. This includes working in fine tolerances, and the molding and heat treatment of parts.

• **Financial position of the company.**

Best chances for subcontract will usually be found close to home, but this is true of the West Coast area more than elsewhere. P&W, in Connecticut, deals with about 4000 firms in 14 states, including 129 in California. Sperry, on Long Island, N.Y., goes as far as Detroit for subcontracting. Republic Aviation has subcontractors in Chicago, Cleveland and Akron. East area manufacturers seem more willing to look for their house for the right man.

As the business expands, subcontractors will be asked to do more and more work, and the heat treatment of parts will probably become a standard for subcontractors.

• **Something to Offer—**But right now, there is not much room for the man who thinks he would like to get some of this lucrative aviation business which he hears is floating around, but has nothing concrete to offer the manufacturer. This probably also leaves out the small man whose only qualification is a desire to get into war work because his sources of new outside are drying up.

If the business-seeking subcontractor's original letter of application shows promise, the major contractor will follow it up. Prospective firms are interviewed from afar and the prospective subcontractor. Or he may be invited to send a representative to the big plant. A sales engineer is a good man for this job. He'll know what the company has produced and what it can produce. He ought to bring samples with him—or photographs, if samples are too big. Copies of the plant floor plan, showing machinery location, also type specifications, will help.

• **Foot in Door—**If the prospective subcontractor passes these tests with flying colors, he may soon have his first order. Or, at worst, he will have his foot in the door, with the prospect of being called to lead an entire job later. The public Aviation will often pass along to other manufacturers the name of a subcontractor it cannot use but who seems promising.

About once a month, the sales engi-



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They also provide a practical solution to the problem of insulating the thermal de-icing systems of both jet and propeller-driven aircraft, as well as

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Definitions

These manufacturers are going to top out about \$2.7 billion for subcontract in the next fiscal year. In addition, huge sums will go for vendors' direct and sub-plants' items. Each company but its own idea as to what these groups comprise, but here is a pretty good overview:

- **Subcontract:** Work done specifically to the design and specifications of the prime contractor. (But Contractor isn't it—anything furnished out during a period of expansion, but normally done at home).
- **Vendor supplies, parts:** Products designed by the seller, or produced to trade specifications.
- **Supplier:** Raw materials and process materials, such as sheet stock, bar stock, tubing.

Outstanding New MICRO Precision Switches to Meet Exacting Aircraft Design Requirements

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TABLE 1. Continued

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[MSB:002 running header: 197041]

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ABSTRACT ... first name is appearing nowhere

you should check back with the prime contractor to keep his company's file alive. This is also a good time to supply a list of any equipment added since the last visit.

Once a subcontractor is lined up, most of the prior manufacturer will be left to help him.

• **Convent**, for instance, will give him plenty of supervision at the start, it will provide master tasks, pay, and fixturs, it will provide helth goods which can be taken apart to show how the part is constructed, it will offer the benefit of its know-how. Convent will send field inspectors to see that the subcontractor's inspection methods are properly set up, but will not accept responsibility for the part until delivery and use are made.

Greenman helps his subcontractors get scarce priority materials. In addition to sending along a bolted model, Greenman team work very closely with the subcontractor to solve his production problems. Before production starts, a few of the subcontractor's key men go to Greenman for a month or two to work on the complete units on the regular assembly line. These men learn and learnings get to know the product very well, and that cuts down on the subcontractor's Greenman policy to delay all present and future work until they will get in smoothly at the piece contract. Greenman decides to use them in making the part in his own plant.

The company helps its subcontractors in legal matters, such as drawing up contracts and fulfilling government regulations.

• República Aristocrática. About a year ago, started a program of auctions on Air Force inspection specifications on use at that time. A group of young inspectors made the rounds straightaway, not interfering problems.

Sperry Gyroscopic policy is to pay the subcontractor for designing of tools and the tool themselves. The company has offered its own standards, pointed out mistakes as it saw them, and furnished the Sperry gyroscopic control manuals as a guide. It has provided research on cutting procedures, loads and quality of tools, work-holds and workups used on parts and so on. In great designs, Sperry has been almost assistance inasmuch as the subcontractor has been. Because usually have reached four cases, two inspectors, two methods, one, a tester and a procedure man. The procedure man was the official relationship was somewhat out of order.

• **Progress Payments**—Although the prime contractors are interested in financial stability, it's still no secret to be poor. And many potential subcontractors are a little wary about taking on business involving complicated or large assemblies which are considerably less and more expensive when

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year they were \$9,900,000, and two years later \$76 million.

• **Win Products.** Principal products during the wartime period were complete power package units for the B-24 Liberator, the P-51 Mustang, the P-52 Mustang, the P-47 Thunderbolt, the P-40 Warhawk, the P-38 Lightning, and the P-39 Airacobra. Other products included the P-51 Mustang, the P-52 Mustang, the P-47 Thunderbolt, the P-40 Warhawk, the P-38 Lightning, and the P-39 Airacobra.

After the war, orders arrived for power packages for the postwar Constellation, for C-54 conversions, Constellation, Boeing B 50s and C 97s, Chase C-120. Rohr also makes the complete exhaust system for Convair's B 56.

Steve Korns, new orders have been received for both power package installations and exhaust systems and current orders have been increased. Robb is buying new equipment for increased production and may have to expand its shop facilities again.

- **Tooting Saver.** Tooting savy is what makes Rake click. When the compressor isn't fully recalcified, it builds what it needs. Examples are a house-made combustion stroke forming and compacting (see forming press now in the works). And special long-armed actuators are sometimes that check the thickness in the middle of a long extruded tube.

Risks aren't any shortcuts to success for subcontractors. But Bert Rasmussen, chief of the tooling division, points out that prime contractors have not only the difficult assemblies. They keep the simpler fabrication in their own plants until specialized products, demands enter factory yards for assembly.

Also the subcontractor usually has to submit a competitive bid. This can be expensive. It cost Rahr \$25,000 to make a survey on one bid, then the company didn't get the order.

• **Rohr Subcontracting.** Rohr contracts out a sizable amount of its own work—about a dozen assemblies and up to 3,000 different machined parts. The assemblies are parts needing metal baring, which the company sends out when its facilities are busy.

Because most of the outside work is machining, Rola's outside production crew specializes in that line. It checks a prospective subcontractor to see if he can turn out work of sufficient quality. It also checks financial responsibility. When Rola contracts out for parts it wants to know they'll be delivered.

In hiring a subcontractor, Rohr looks over possible sources for equipment, potential work load, and so on. Then the company selects those it feels to bid on a job. All things being equal, the job will go to the lowest bidder.

Robt. maintains a record of subcontractors—their ratings at meeting delivery promises, quality of work, and

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a quietly mood of apoplexy. The company then in every way to help its subcontractors eliminate the need for rework. It supplies subcontractors with information of all sorts, a book of shop practices required by Rahr customers, and other aids.

Rahr likes to have its sources in close to the factory as possible.

► **Ryan Aeronautical Co.**, San Diego, Calif., is about half prime contractor and half subcontractor, but is hardly typical of small manufacturers who might venture into aviation subcontracting work as a matter of expanded overall production. With an established name and reputation, Ryan doesn't have to go out and sell itself.

► **Good Knead**, Most important, a prospective subcontractor should establish a good record for on-time delivery and quality workmanship. Prime contractors have a tendency to go back to dependable sources.

The type of work a subcontractor can get will depend a lot on his experience. For example, Ryan, with long years of experience in turbine and turbo-propulsion, was a natural for subcontracting of jet engine parts. The company was subcontracting right away. In less time the prime contractor will



NOISE SECTIONS of turbine inlet are made by Ryan as subcontractor for Aerojet.

lead to pull the work back to his own plant. Allen the subcontractor has to give his whole program to the prime contractor's master schedule.

Ryan has made it a point to establish a good record for its prime building work. The company got in the aircraft business to help smooth out the peaks and valleys of plane building.

Some of Ryan's subcontract activities are all sections of the C-97, dropable fuel tanks, exhaust systems for piston engines, turbo-propeller pipes, jet engine tail pipes, jet ports for the B-36, and components of the J-47 engine.

This Avco-Winn subsidiary of the nation's major prime contractor has covered the parts which apply to most of them. Other items of importance are included in the individual write-ups which follow.

► **Boring Airplane Co.**, with plants at Seattle and Wichita, has been connected to a large subcontracting program for several years.

After World War II, Boring found itself in a better position than most aircraft manufacturers, with military demand for three of its planes—the B-36, C-97 and B-47. William M. Allen, Boring president, suggested that the government should place orders with the thought primarily of getting the most airplane for its money, not of keeping all the manufacturers solvent.

The manufacturer who got such orders didn't do what he could to parcel out work among his fortunate manufacturers. Allen advocated it. In line with Allen's speech, Boring followed a large subcontracting program.

► **Subcontractor** Subcontractors. Early in 1949, about 77 percent of the B-47 airplane was subcontracted. This per-

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teering was reduced somewhat later in 1949 and only this year, but was increased again with the Korean situation. The exact amount of Boeing's present subcontracting program is not revealed, either in terms of dollars, specific materials or airborne weights, but B-47 work now subcontracted probably exceeds 17 percent.

The percentages on the B-47 and C-97 probably is lower, because those projects have been in existence longer and Boeing had to do most of the work at its Seattle and Renton plants to keep its work force together.

Total amount of work now subcontracted, nevertheless, is roughly comparable to what it was during World War II. The new orders Boeing has received increased the subcontracting program "substantially."

Except for the B-47 program, the additional work has been placed principally with suppliers previously participating in Boeing projects. In virtually all cases, the suppliers who received C-97 and B-50 subcontracts several years ago are in a position to furnish the assemblies and parts needed for new work recently authorized.

Boeing's Wichita division, faced with new requirements, is expanding its subcontracting program for the B-47. Fully responsible for the new aircraft, reached after consultations with civil and military officials, to try to avoid any expenses program which would further tax the City of Wichita's already-overloaded water, sewage and power facilities. Most of the Wichita division's subcontracting that will be aimed on outside of Wichita, although within the Midwest, as far as is practical and possible.

Consolidated Valtel Aircraft Corp., San Diego, Calif., has about thirty subcontracts and about 800 regular suppliers.

OH is present work, about 20 percent of the T-29 is contracted out. That includes the landing gear and power plant. The figure on the B-46 is from 10 to 15 percent. The dollar value is not given.

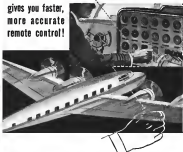
Under potential business prospects, General's subcontracted work will soon go up to about 30 percent on a new low and weight basis.

Graphic's location is important, as some components are not made and highway distances. Ryan had to knock off the bottom layer of plastic from the flat cars that carry the C-97 air freight sections so that they would clear.

During preliminary contacts with prospective subcontractors, General's subcontract programers. The company explains that it expects sub-contractors to improve their rate of efficiency. General's also studies the

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Page 11

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forth in present industrial mobilization bills, but this will not actually start until November, with the peak coming next September. Until the government does appropriate items of the food control agency, not too much will be done in the way of expanding subcontracting or having new personnel.

Geographical location does not play an important part in choosing subcontractors for interested parties. Machine parts are a difficult story. Government tries to keep these locked, generally to cut down on inspection traveling time. But some are located as far as New Jersey and Pennsylvania. Mostly, the business is kept in Government's own backyard.

The subcontractor's workmanship and accuracy and past production rec-

ord are important to Government.

► **Hawthorn** Standard division of United Aircraft Corp., E. Hartford, Conn., buys from about 1000 subcontractors and sends in 25 orders. Sixty percent of these are in Connecticut and New York, but some are as far away as California.

To Hawthorn, a subcontractor is a manufacturer who contracts to make a part or component in the design of the prime contractor.

A vendor is a company or individual who sells a device or finished product of its own design.

► **Lockheed Aircraft Corp.**, Burbank, Calif., admits to only one subcontractor—**Rohr Aircraft Corp.** of San Diego.

Rohr makes the complete ready-to-install power package for the Constellation.

But the company has over 2500 regular parts suppliers.

About 40 percent of the Constellation (in dollar value) is outside purchase—wires, stands, etc. The figure for sub-contracting is about 35 percent of the contracts in dollar value.

Right now Lockheed is collecting all information on subcontractors: possibilities—first machinery, plant space, general production, etc. The company wants to have as full a good list of sources as it can get together.

Lockheed ignores its expense and cost the place of each prospective subcontractor. The company says it will probably give out small jobs to start.

Lockheed prefers companies with previous aircraft experience, people who understand aviation problems and specifications.

The company says it is cautious in selection of its subcontractors because it has just been given the Air Force inspection privilege. Lockheed was the first company selected to perform as a tool house inspection work previously handled by Air Force inspectors. The company is anxious to maintain its present quality control.

► **North American Aviation, Inc.**, Los Angeles, has about 330 subcontractors.

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sons. That's according to North American's definition of subcontractor-sub assemblies. It doesn't include catalogues, tools, raw materials, supplies, services of general agencies, contractors, etc.

North American contracts out many assemblies it could do on its own plant. But it tries to subcontract to the most advantageous Air Force policy.

The company is unable to separate its strictly surplus supplies from its vendor list. But approximately 1500 people sell everything from paper clips to sensitive electronic devices to North America.

Approximately 22 percent of the dollar value of plant contracts is subcontracted out to further subcontractors.

•**Know-How.** Know-how and adequate facilities are two of the things North America looks for in buying up a subcontractor. Geographical location is important, too. NAA likes to have subcontractors in the local area for expediency, would prefer them right across the street.

In the last year a number of North America's workers set up their own shops with a few thousand dollars. Mostly they did nothing machine and little work.

•**Northrop Aircraft, Inc., Hawthorne, Calif.** presently has about 150-400 subcontractors. That includes about 10-15

people who make castings and forgings to Northrop specifications. The subcontractor list also includes people who do outside machining in plants, some who make parts like spacers in special plants. But it doesn't include suppliers who supply articles "off the shelf."

Northrop's present table of subcontractors is small because it hasn't had too many let orders with NAA. But Northrop is looking up for increased production on the F-49 Scorpion all-weather interceptors, and it's a good guess the number of subcontractors will soon double or triple.

Northrop has about 2000 active suppliers. About 1500-1600 are regular suppliers. These figures do not include government-insulated plants.

•**Stand Up.** Northrop's vendor (parts supplier) list will be expanded only if it is necessary to look for more sources. The company already has laid up at least one source for every item it might be.

Northrop contracts out 40 percent of the airplane in terms of material. No figures available on the amount of the plant subcontracted in terms of value.

The company's buyers live the penetration of choosing the best subcontractor to do the work. That's because they bear the chief responsibility for getting the work to an end.

•**Location Important.** Geographic location is very important to Northrop.

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By Capital Airlines



The company prefers to subcontract to local sources. Chief reason is that close liaison is demanded for all the numerous changes that take place while an airplane is in production. Los Angeles has a tremendous scope of subcontracting, so there is little problem there.

Nothing doesn't necessarily look for a piece of some size to start with. Of course, large assemblies require a pretty big plant. But otherwise the ability to do the work on schedule is paramount.

The company has some cases where a cut rate they set a welcome addition to the list of subcontracting. In many cases, he said, small plants can do the job more efficiently and at a lower cost.

out. The big ones sometimes are too bogged down in paper work.

► **Fort & Whitney Aircraft Corp.**, East Hartford, Conn., follows Friedman. Revitcher's long-established policy of sending out at least half of its work. It is still dealing with nearly all the 200 suppliers on its original list of 25 years ago. The list itself has grown to 9600 names.

Many companies in the Hartford area have built their whole business around F&W subcontracting.

Typical subcontracting include castings, forgings, gears, suspension, tailfin blades, miscellaneous hardened and ground parts, screw machine parts, etc.

Vendor items include valves, carbon tons, magnets, fuel pumps, control devices, fluidic switching, gauges, bearings, fasteners, rubbing parts, etc. Suggested items are raw materials and process materials, such as sheet stock, bar stock, tubing, plating materials, etc.

► **Republic Aviation Corp.**, Farmingdale, N. Y., has tried to keep practically all of the better subcontracting that wanted for it during the war. Since the end of the war, it has doled out small orders to the reliable firms not to keep them open and on the books.

At present Republic is doubling its production from 14 to 3 planes a day and doesn't need any additional subcontracting, since the present ones can handle the increase work.

Republic has about 50 percent of its volume production out in subcontracting amounting to around 25 percent of the dollar value.

Probably 15 percent of entire original equipment and assemblies come from the West Coast since that's the principal place of their manufacturing. Usually though, subcontractors don't go further than Chicago.

► **Whole Part.** When a part is turned out, Republic prefers the subcontractor to make the whole part. No work is done on the material in Republic, either before or after the part is completed. Extra responsibility on the subcontractor for the quality of workmanship of that part.

The most vulnerable side of the small subcontractor is his lack of a suitable inspection system. He should try to maximize adequate quality control. A Redwood hardware tester is a must for a subcontractor.

Any welding work must be done by a certified Air Force or Navy welder depending on which service the game contract is with.

Normally, the lowest bidder gets the contract award. If the figure is very much lower than the next bidder or Republic's estimate, the person by which the subcontractor arrived at his figure is checked. Sometimes it may be a new twist and a good idea, or again it may be a matter of under-estimating. Republic doesn't want bad prices to show up by being delayed on delivery dates.

Republic thinks the small man should throw at least 10 percent of his plant into subcontract work. The ideal air up would be to use about 50-60 percent. To get this much done in that kind of production, it would be best to have two or three small orders. Even when going full blast, the volume should represent more than one order, possibly three or more. That is a combination of one will not put the company in a lull. Republic now has about 325 subcontractors.

(Continued on page 111)

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New Standard Hangars at Minneapolis provide needed service facilities at minimum cost

Three firms already serving business, recently completed at Minneapolis is Real International Airport in Minneapolis, give Northwest Airlines an additional 19,000 square feet of hangar space. The largest will (picture shown above), with a floor area of 10,000 square feet, houses two Boeing Superstratocruisers. Part of the other two, with no more of 10,000 square feet, will house 3 Boeing 747's and 1 Boeing 767-4 simultaneously. Such more, cheap and often space are included in a separately erected structure between feet of the hangar. Total cost for this complete installation was \$1,140,000—about \$11.75 per square foot.

HERE'S real economy in new hangar construction—made possible by taking full advantage of the low-cost construction obtainable with Luria Standard Hangars.

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There's a Luria Standard Hangar to meet every airport requirement—and a Luria Standard Building that's adaptable to your exact needs for cargo terminals and other airport facilities. Send coupon for further information.

Standard Buildings
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The transportation problem becomes important when production is critical, as in wartime. So, for the sake of saving dollars, Republic thinks that large orders should be split between two or more suppliers. Thus savings in the nation of the country need not delay final assembly of the aircraft. The idea may be of use to subcontractors too, when they order.

Republic suggests that now is the time to line up subcontractors at a moment of holding onto technicians who may be getting restless in defense work and higher salaries go elsewhere.

• **Sperry Gyroscope Co.**, Great Neck, N. Y., has done a thorough job of subcontracting its largest precision contracts.

This contract is for an automatic safety anti-aircraft gun fire-control unit, ground operated. It is a large piece of machinery comprising many separate components, or "assembly packages." These 74-75 units were designed to be made separately, and it was found that about 10 could be subcontracted out.

• **Phil Sperry**, Sperry started out with a motto: at all the firms that could legally be expected to handle the work. This idea was gotten from records of past business transactions. Thomas Regan, chairman of the board, who Sperry was asked that was known to do certain kinds of work, the best suited firms were determined by reputation, character, past or present correspondence, and listed for further study.

The initial list of 110-120 was narrowed down to about 40 or 45 companies who were visited. All that was available to show the type of work required were photos of the separate parts of the machine. This initial visit determined the best subcontract firms and the ones that could not handle the specific kind of work at all. The list went down to about 25 firms who were now sent available blueprints.

The idea was to have about 1 different plan connected in each package or type of package. It was possible and desirable to combine two or more similar units, such as the assembly and electric induction. Some of these units used the same basic design and only slight different components which made their assembly and reassembly by the same firm desirable.

• **Poussin Vaut**. If a company indicated it was interested, a "questioning" visit was made by a group of engineers, in person, quality control, and methods people to see the kind of a place they were doing business with. If it was okay by the inspection group, formal plans were sent out and bids asked for each assembly. A breakdown of each bid was also required. Later, these prices were compared to Sperry's estimates. (Up to this time Sperry had sub-



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built two prototypes with a third under construction.)

As the quotations came back, they were reviewed with the men thought to be the lowest bid. Other considerations were the delivery dates promised and the expected capacity of the plant to meet these delivery dates.

Quality Control. One very important factor was the degree of quality control employed at the plant. This in the "old-school" of Sperry was all the units are guaranteed and have made their reputation. It was absolutely necessary for each plant to have some form of quality control and the better systems were given greater consideration.

Finally about a dozen subcontractors were signed up. The entire operation took about four months but Sperry felt it was more than worth it when the parts start rolling in.

For the particular order, about 40 percent will be turned out. This amounts to about 10 percent of the contract value, or roughly \$10,000,000.

Small tooling and tool work is given out quite a lot. Any good quality shop can expect to get a fair amount of this work in the near future, if good business is increased enough to warrant it.

Anyone interested in subcontracting for Sperry is invited to send in any kind of brochure, pamphlet or other literature describing available facilities and the work done.

Interviews are granted to any past positive subcontractors who visit the plant, although a phone call first is suggested. All correspondence is kept on file. Sperry is pretty well set up now, but the company is always looking for subcontractors who can meet its standards, as policy is to have three or more good firms looking on each order—with the contract often split between the two lowest bidders.

Officials feel that any good, reliable man should have no trouble getting as many subcontractors as he can handle. The outlook for firms which are financially shaky is not so good at the present time.

Wright Assembled Corp., Wood Ridge, N. J., is making a study to determine what its volume of production will be and just how much of that should go to subcontracting. At first, Wright doesn't do very much outside work. It is all machine shop operations—essentially. Wright wants to do all of the work itself that it possibly can. If any work is given to subcontractors, they are expected to do the complete job. Wright doesn't do any work on the part before or after the vendor's work.

Security. Almost all supplies who work for Wright must be checked for military security reasons. Their prices

start off with government inspection, usually by FBI men. Then they enter into a security agreement with the Wright organization.

Wright now has about 10-15 subcontractors on the books. Very few were kept on after the war—the idea was to keep it as open as possible.

Geographical location is not important to Wright. Work is received from as far as Chicago and Detroit, coming in by truck. Economic reasons are more important now in determining who shall get an order rather than keeping the work right in Wright's own backyard.

Air Force Buying Moving Into High

The heavy outpouring of Air Force expenditures for defense is typified by a recent work's contracts received for processing by the Chicago Air Procurement Field Office.

Contracts valued at \$6,445,210 were awarded, according to Lt. Col. Charles C. Egan, chief of the office. Of these, some, totaling \$10,000 each, went to manufacturing facilities in the 14-state area served by the office. The ones included Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Wyoming, Montana, Colorado, Kansas, Iowa, Missouri, Nebraska, southern Michigan, and northern Indiana.

A dollar total for August was not yet available, but during July, 1950 contracts were awarded, with \$145 million still to be paid by the government to contractors, as of the end of that month.

Col. Egan suggested that businesses seeking subcontracting get in touch with procurement officials at their local or regional Air Procurement Field Office. Additional information may also be obtained from local chambers of commerce, trade associations, state employment offices, Department of Commerce offices, and at the Information for Business of the various AF procurement field offices.

Big Contracts Seen For Boeing-Seattle

Boeing Aircraft Co. is clearing the path of its Seattle plant in anticipation of government USAF contracts resulting from the Korean trouble. The Air Force already has asked the company to make proposals concerning various projects. These have been made and now Boeing is awaiting the military's decision.

Optimism was further developed by Sen. Warren G. Magnuson, who predicted, after conferring with AF officials, that Boeing-Seattle can expect between \$900-\$1000 million in orders,

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MODEL A-15 Primarily designed for handling extrusions but also suitable for narrow sheet stock. Simultaneous arm travel. Tension cylinder assemblies moved by integral power units. Length capacity exceeds standard Model A-12. Max. tension at 2000 psi—206,170 lbs.

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because of the pool of skilled aircraft workers in that area.

In light of these developments, the company not only has canceled previously scheduled employee layoffs, but has been advertising for skilled mechanics and tooling engineers. Boeing's vice president-manufacturing Fred Egan says that 100 skilled mechanics are needed immediately.

Present schedules call for completion of a B-73 Superfortress contract that calls for 100 B-73 Superfortresses plus nearly 100 B-47 Strategic bombers and five C-97 transport. In addition preliminary construction has been started on the XB-52. The company is now striving to make these orders through to go to have facilities clear for new work.

Security Regulations

Revised Munitions Board security regulations covering government contractors are coming out. They will deal with security clearance of a contractor's facilities as well as his employees.

Major changes apply to clearance of employees on classified contracts. When a manufacturer has contracts with case three and government departments, only one department will make the security checks, to avoid duplication.

When a worker moves from one con-

tractor to another, his record will be cleared through a central security index he maintains in Washington. Thus, a worker will be able to carry his clearance status along with him from one job to another.

In many cases only parts of a contract will be classified. This will reduce the number of workers who will have to be cleared for security.

Aviation Boom Grows in Wichita

Wichita—The aviation industry in the Midland city is booming with the usual buttresses of labor, materials, and housing leaning just over the horizon.

Boeing-Wichita is the biggest of the aviation and components manufacturers around here, a group which includes Beech, Cessna, Swallow and Skylark, Inc. Boeing-Wichita is just entering into production of the so-called B-47 jet bomber.

Currently, Boeing employs approximately 11,500 personnel on two eight-hour shifts and a third shift shift. Plans are to increase employment gradually to 15,000 by December 1, in order to meet USAF requests for initial production.

USAF plans to have its first B-47 wing operating by mid-1951. Air Force has asked Boeing to step up production of more than 180 of the jet bombers, so contract is completed by mid-1952, instead of in 1953 as originally planned. Two of the big bombers have been built. Four more are nearing completion.

Production of the bomber is being moved along through considerable subcontracting both in the Wichita area and elsewhere. All three of the other local manufacturers, Beech, Cessna and Swallow, are engaged in B-47 work. Swallow Aerospace will continue itself to small parts manufacturer. Cessna is a major assembly project and Beech will likely engage in B-47 modification at its newly acquired Hanger AFB, Kan., facility. The Hercules facility was used during World War II as a B-29 modification center.

The expectation is that Beech will be called on for more modification of over 400 of the Boeing medium bombers. Approximately 70 of them will be the B-47C, with first job.

Beech, in addition to producing to meet a heavy commercial business, is currently making jettable 165 psi F-30 wingtip jet tanks. It is also continuing rehabilitation of Navy Beachhead strike planes (about 90 are on the Beech wings now). The company expects also to build between 400 and 500 Beaumont before the end of the year.

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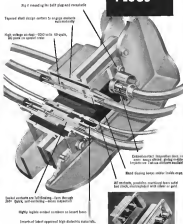


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How USAF Helps A Subcontractor

A subcontractor is ease removed from the government agency that granted the prime contract on which he is working, but on occasion the government agency will go to bat for him to see that he gets his money.

This cropped up earlier this year at the hearings before the House Appropriations Committee on the Air Force fiscal 1959 budget.

Just when the government's responsibility to the subcontractor begins and ends has been a fair legal point ever subcontracting flourished during World War II. Going over the ground again with Lt. Gen. K. B. Wolfe, USAF chief of procurement, Rep. Harry Steagall, of Calif., was told that the Air Force watches the prime contractor's accounts pretty closely.

■ **Waiver**—Before the Air Force will make a partial payment on a prime contract it checks the contractor's accounts to be sure he has discharged his obligations to his subcontractors. "That is the only hold we really have on him (the prime contractor)," said Gen. Wolfe, "when he comes in and asks for partial payments or advance payments."

Other than that, the Air Force tries to stay away from relations between the prime and subcontractor. In future contracts, the service will tell a contractor he may use subcontractors, but to assure the contractor that he will not be breaching his agreement if he firms out part of the work.

■ **Legal Responsibility**—But when the Air Force puts such a provision in a contract it becomes a legal matter whether the government has any responsibility to the subcontractor. Gen. Wolfe pointed out that the prime contractor negotiates directly with the government on responsibility and indemnification of the contract price. This isn't always true of subcontractors, they have to have it up to the prime contractor to look out for their interests.

And once that was, according to Gen. Wolfe, "the little businessman has to come back to us and complain that he is not being treated by the prime contractor the same as the prime contractor is being treated by us."

It seemed to be the opinion of both Gen. Wolfe and Rep. Steagall that the prime contract should be framed in such a way that it would be clear that all responsibility to subcontractors begins and ends with the prime contractor.

But they both also agreed that to accomplish that end would require a very thorough legal warry of the entire situation.

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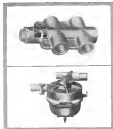
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The Outlook for the Labor Supply

If you have to hire for defense work you may have trouble getting certain skills in certain areas.

If you think you will have to hire new employees to fill defense orders, here is the way the situation looks.

Manpower is getting tighter, particularly in aircraft centers. This applies both to overall labor supply and to skills necessary to aircraft production.

No manpower controls—compulsory, that is—the basic standard is War Relocation under the "current situation"—meaning a war confined to Korea. But there are a number of voluntary measures already in the works, or contemplated, to help alleviate the manpower shortages cropping up in key production areas. These include:

- Giving priority to defense contractors at the employment offices in handling requests for workers and in referring job applicants.
- Training programs for production workers, like the apprenticeship program is approaching crafts and the Training-Warfare Industry for apprentices of the last war.
- Draft deferment for young men on the "critical occupations" list of July 24, 1950, issued by the Labor Dept.

Secretary of Labor Maurice J. Tobin is working with the Defense Dept. and Selective Service on formulating a different policy, is directed by President Truman in his executive order of Sept. 9 implementing the Defense Production Act.

• Asking women and others who have left the labor force, particularly those with World War II job experience, to return to the plants.

• Encouraging longer hours. Sometimes this is necessary to make up for a short age of speed skills. Some are working 60 hours a week in Seattle, say reports reaching the U. S. Employment Service.

Here is what has been happening. Nationwide, the tightening of labor supply is reflected in the drop in unemployment from 7.2 million to 2.5 million and the increase in jobs to a record 62.3 million.

Tight Supply—Locally, it can be seen in the increasing number of units with tight labor supply. In July, for instance, before defense production could really get going, employment went up in 130 of the 145 major industrial areas na-

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used by **UNITED** Employment dropped in 99 areas despite the influx of migrant workers. Northern was called "A" area with less than 5 percent unemployment.

Job openings filed with local employment offices which couldn't be filled in the last area rose from 13,000 in July to 22,000 in August.

Skilled labor shortages hit aircraft production centers hardest. Most frequent shortages reported were for mechanical, electrical and aeronautical engineers, machinists and machine tool operators, tool designers and tool and die makers. There is a general tightness in all skilled working jobs.

UNITED reports employment rising sharply in Wichita, Seattle, Los Angeles and San Diego. Indianapolis and Detroit were among the "A" tight labor supply areas in July. Nine aircraft centers improved their unemployment classification, Seattle moving up two notches.

► **Employment Report**—Here is a rundown of the situation in aircraft centers as reported by **UNITED** for July.

► **Baltimore**—Short acfts on these flights. Some lengthening of hours. Defense contracts push employment gains. Some skilled shortages there.

► **London**—Employment up, but not picking.

► **Philadelphia**—Crews. Metalworking employment rising, will go higher. Shortage of help going to allied work.

► **Buffalo**—Labor demand to skyrocket if defense contracts under negotiation materialize. Skilled and semi-skilled machine shortages likely. Several plants in major aircraft will add second shift.

► **Chicago**—Labor supply tightening. Skilled metal shortage getting acute.

► **Cincinnati**—Spot labor shortages appearing, but not yet slowing production.

► **Columbus, Ga.** Spot labor shortages may slow production in Lockheed, aerial fabrication, aircraft design. Some aircraft production.

► **Cleveland**—Spot shortages of skilled factory workers increasing, but not expected to hamper planned tool expansion in machine building.

► **Dallas**—A tight labor area with less than 5 percent unemployment. Jobs at postwar high. Aircraft gains figure in rise, further expansion expected. Inauguration and contractors segment labor supply. Some aircraft shifts short.

► **Detroit**—Jobs at postwar high. Labor market crowding markedly. Overcrowd in shortage occupations hampering production for now.

► **El Worth**—Employment up slightly, but employment also up due to inauguration. Labor supply generally adequate, but not of new contract anticipated for skilled aircraft jobs.

► **Hartford, Conn.** Machinery jobs rising. Shortage of skilled factory workers.

► **Indianapolis**—Unemployment cut in half despite layoffs due to steel shortage. Tight labor supply now, less than 5 percent unemployment.

► **Kansas City**—Skilled labor shortages increasing. Some shortage of having standards

kept for those digits for the day. • **Los Angeles**—Aircraft employment up. "Still many" production centers back. Full output, increasing difficulty in some months jobs.

► **New Haven**—Labor supply generally adequate. Some severity of skilled workers.

► **New York**—Marked expansion forward for many areas, especially in metalworking. Labor supply conditions variable.

► **Philadelphia**—Metalworking leads job opening. All industries planning expansion. Labor generally adequate, but shortage occurring in a few skilled occupations.

► **St. Louis**—Labor shortages not severe, but demand for skilled workers growing.

► **San Diego**—Aircraft leads job opening. Some aircraft shifts short, but no retreating yet of basic standards.

► **Seattle**—Employment cut sharply. Skilled metalworking experience lowest in area. Already experiencing skilled labor shortage and largely on 40-hour week.

► **Tokyo**—Moved out of depressed war production. Rising openings in metal fabrication, glass and other industries.

► **Toronto**—Jobs up. Shortage of skilled workers likely to develop.

► **Wichita**—Normally expansion leads job employment gain. Spot labor shortages, primarily skilled aircraft workers. Out of area recruitment under way.

Wage Laws

Wash-Healey Act covers many subcontractors in the aircraft industry.

Government contracts of more than \$10,000 are subject to the 1936 Wash-Healey Public Contracts Act covering wages, hours and working conditions.

Except in airplane assembly, a subcontractor who does directly with the government is covered by the act. The public contract law if the prime contractor, is subcontracting the work, is exempt from the act. This is, however, a limitation of the act. It is, however, a limitation of the act. It is, however, a limitation of the act.

Any subcontractor to an airplane assembler, however, is automatically a bona fide subcontractor, not covered by the public contract law, because of a ruling issued in 1940 by the administrative act of the War Relocation Authority and Public Contracts Act. The ruling still stands.

► **Various Exemptions**—That specific exemption to the rule was made to subcontracting airplane assembly because at that time in 1940, the vast increase in airplane production threw out of gear the regular practices of airplane assembly.

The change was such that the subcontractor, in a letter to the industry, made an official policy that there no longer existed any "regular" practices in airplane assembly that could be used as a guide. Therefore, he ruled, any memo

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factory supplying an airplane assembler was a bona fide subcontractor and thus not covered by the Walsh-Healey Public Contracts Act.

The assumption does not apply to other parts of the aircraft industry. A subcontractor not filling a contract with an airplane assembler must observe the law if he is doing a job which, under regular practice, is usually done in the industry of the prime contractor.

Furthermore, he is covered by the law if he produces the final product for which the government has contracted. When a man by the "regular" industry practice and "final product" rules?

• "Regular" practice rule extends their

If airplane engine producers customarily make their own valves, this would be considered a regular practice. Then any company with a government contract to deliver airplane engines would be deciding from the regular practice if it subcontracted for valves, even though this particular company always has let valve work out. A subcontractor doing this valve work would be considered a "subcontract manufacturer" and thus covered by the law.

When in doubt about what the law requires, you can find out by writing to William T. McCoskey, Wage Hour Administrator, Washington 25, D. C. On request, he will also send you Regulations and Interpretations of the Fair-

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Wage Booklets

Two publications of the Bureau of Labor Statistics may help you as wages.

• **Wage Selections, Airframe, 1949** analyzes the wage structure, the wage rates and selected wage practices of 22 airplane manufacturers as of March, 1949. A summary appears in the BLS Monthly Labor Review, January, 1950. The detailed survey may be obtained by writing the Bureau of Labor Statistics, Washington 25, D. C.

• **Job Descriptions for Wage Studies, Airframe**, gives the detailed descriptions of some 75 aircraft jobs. BLS follows them in collecting airplane wage data. It may be obtained by writing BLS.

be Contracts Act, which will be helpful in understanding the law.

• "Final product" rule works like this: Suppose some company has a government order for 10,000 propellers. For some reason, it cannot or does not wish to fill the whole order. So the company subcontracts half of the order. The subcontractor will make the complete propeller as ordered by the government. That is a final product, and work on it is covered by the law.

• **Public Contracts Act—What do the terms of Public Contracts Act provide?** A minimum wage must be paid for all work on a government contract as a subcontract which is covered by the law, as explained above. An aircraft, if it is 50 lbs. or less, completed at hourly or piece rate. More favorable wages in some contracts are not affected.

• **Apprentices and handicapped workers may be paid less than \$1.01 if you get approval from the wage-hour administrator, but apprentices may not be paid less than 75 cents.**

• **Time-and-a-half overtime** must be paid after 8 hours a day and 40 hours a week (unless you have a guaranteed annual wage contract with an union).

• **Child labor.** Boys under 16 or girls under 18 may not be employed on these contracts. Presumably \$10 for each violation every day he or she was employed in violation of the law.

• **Certain safety and sanitary standards** must be observed.

• **Detailed payroll records** must be kept. The minimum wage was raised and the industry definition changed on July 8. The official definition and other data pertaining to the aircraft industry are contained in Section 202.23 of Title 41, Chapter II, Part 202, Code of Federal Regulations. A copy may be obtained from the Administrator.



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Keeping Secrets

You must have security clearance to get any classified contracts.

Before you will be allowed to produce certain equipment for the government, you must be able to protect sensitive facts from the enemy. This rule applies to contractors and subcontractors alike.

• **Before Getting Contract**—Before you can even get a look at a classified contract to order to prepare a bid, you must have a "factory security clearance."

This consists of:

• **Examination of the plant** to see that it is physically adapted to protect war secrets.

• **Check on officers, directors, owners and any key employees** who will have access to classified secrets.

Factory clearance will be denied if the plant, shop, laboratory or other place where the work will be done is physically unsuited to secure protection against espionage, sabotage or other subversive claims.

It will also be denied if any key person who will have access to the classified matter is "suspected" according to standards set up by the Army-Navy Air Force Personnel Security Board.

Clearance usually will be denied to any employee who:

• Has been involved in treason or subversion.

• Is under the influence of a foreign government which might jeopardize the security interests of the United States, or if any key employee cannot be cleared.

Clearance usually will be denied to any employee who:

• Has been involved in treason or subversion.

• Is under the influence of a foreign government which might jeopardize the security interests of the United States, or if any key employee cannot be cleared.

• Has suggested the overthrow of our government by force.

• Has disclosed classified information to persons not authorized to receive such material.

• Does not use the integrity, discretion or responsibility necessary to keep a government secret.

• Is or has been a member of one of the subversive organizations on the list that are named from time to time by the Attorney General.

In contracts for atomic, parts and accessories, a special class of government (NSA Form 40) must be filed by all those who have access to the plans or mechanisms or construction, or will participate in the secret tests, whether or not access to classified matter is required.

Security clearance will not necessarily be denied because you happen to have a non-secret employee who cannot be cleared. Rather this denies the employee you may put him on non-classified work.

Denial to deny clearance is made by the ANAFSSB. Unless clearance is denied because of the plant's physical demands, you may appeal a denial to the Industrial Employment Review Board in the Pentagon.

• **Before Beginning Work**—Integrity and trustworthiness of employees working on classified contracts is deemed essential to maintain security not accidental to the handling of military information by a contractor or its materials.

Investigations are made by the department employed by the contractor. Classified military information may not be given an employee until he has been "cleared."

"Background investigation" is made of all employees who will have access to "key secret" matter and of all others who will have access to any classified information. This is a full investigation of the employee's activities over the past ten years.

"National agency check" is made of those employees who have access to "secret" data. This is a check of FBI and armed forces intelligence files. If derogatory information is found, then a background investigation is made.

No check is made of an employee with access to "confidential" or "restricted" matter unless he is an alien or there is evidence that he is a security risk.

Employees also may appeal denial of clearance to the Industrial Employment Review Board.

To execute contracts, clearance requirements can be modified to a certain extent.

Clearance records, both as to facilities and employees, are kept in a Central Index File at the Pentagon, in that data was checked won't have to be duplicated.

• **After Work Begins**—Responsibility for plant production rests basically with management. However, plant management should maintain liaison with local military commanders. It is responsible, too, for the security of classified information which may come into its possession as a result of its contracts. Sealed sets of drawings or equipment should be retained to the extent FBI office.

More detailed information and cases about new and suggestions of the Defense Dept. are contained in a 24-page pamphlet, "Principles of Plant Practice," just issued. It was prepared by the Industrial Security Division Office of Manpower, Materials Board and is available for 15 cents from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

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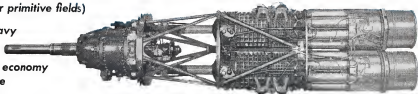




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